# THE STANLEY WORKS

Since 1843

NEW BRITAIN, CONNECTICUT 06050

(203) 225-5111

February 29, 1984

Ms. Barbara L. Bush Office of Solid Waste (WH-562) U. S. Environmental Protection Agency Washington, D. C. 20460

Re: Delisting Petition #0533

Dear Ms. Bush:

Enclosed please find the additional information you have requested to complete the review of the Delisting Petition (#0533) submitted by The Stanley Works Corporate Laboratory for the Stanley Tools - Fowlerville facility. I have attached the Material Safety Data Sheets for the chemical compounds used in our finishing process that may enter the waste stream. You will note that I have not included the data sheets on the basic raw materials that make up the primary plating process solutions such as, sodium cyanide, caustic soda, copper metal anodes, nickel sulfate hexahydrate, nickel chloride hexahydrate, boric acid, nickel metal anodes, chromic acid, sulfuric acid, and insoluble lead metal anodes. Much information on the safety and toxicity of these materials can be readily obtained from a variety of reference materials.

The additional information you have asked for, will be answered in Paragraph form.

# Past Disposal Practices:

The Stanley Works acquired the Stanley Tools - Fowlerville facility in January of 1980. The metal hydroxide sludge was accumulated in the surface impoundments until October 1980, when approximately 97,000 gallons of metal hydroxide sludge was pumped out of the surface impoundments by Chem-Met Services of Wyandotte, Michigan and transported to their facility for disposal. The remaining sludge was left to accumulate in the surface impoundments and became regulated as hazardous waste Code #F006 under RCRA on November 19, 1980.

Ms. Barbara L. Bush Office of Solid Waste (WH-562) U. S. Environmental Protection Agency Washington, D. C. 20460

Re: Delisting Petition #0533

# Current Disposal Practices:

Chem-Met Services, EPA ID# MID096963194, is still being contracted as the disposal firm for the F006 waste stored in the surface impoundments. Once yearly, the surface impoundments are pumped out. The F006 sludge is transported to Chem-Met's facility where the sludge slurry is dewatered and the resultant solid sludge is combined with other solid metal hydroxide sludge of the same hazardous waste code classification. The solid material is then transported to Wayne County #2 Landfill for disposal.

# 3. Proposed Disposal Practice:

In the event that the F006 waste is delisted, the sludge would be handled as a solid waste and would be sent to Chem-Met Services for dewatering. The solid sludge that remains after dewatering would be sent to an engineered landfill for proper disposal.

# 4. Tests for Characteristic Hazardous Waste:

Ignitability Characteristic; The F006 sludge would not exhibit the characteristic of ignitability because the material is an aqueous slurry with approximately 97% water and 3% solid metal hydroxide sludge which does not readily ignite nor support combustion. This material does not exhibit a Flash Point less than 140°F.

Corrosivity Characteristic; The F006 sludge does not exhibit the characteristic of corrosivity. When the pH of the sludge was measured, it was found to fall within the 9.03 to the 10.50 pH range which is within the non-corrosive pH range.

Ms. Barbara L. Bush
Office of Solid Waste (WH-562)
U. S. Environmental Protection Agency
Washington, D. C. 20460

Re: Delisting Petition #0533

Reactivity Characteristic; The F006 sludge does not exhibit the characteristic of reactivity. The sludge does not react violently with water and when exposed to mild acids or alkalies does not generate toxic gases or vapors. Analysis of the sludge indicates that the free cyanide level in the sludge is well below 10 mg/l limit.

5. Total Metal Analysis, Arsenic, Mercury & Selenium:

The total metals analysis for arsenic, mercury, and selenium has been provided in Part I of the Delisting Petition. This information is available on Pages 7 and 55 of Part I of the Petition.

6. Total Organic Carbon Analysis:

Attached, with this letter, are the results of the Total Organic Carbon analysis (TOC) performed upon sludge samples from both the clarifier blowdown and the surface impoundment system. As discussed with Mr. Morse in our phone conversation of January 27, 1984, five representative samples would have to be submitted for TOC analysis. One sample being a composite sample of the clarifier blowdown, and the remaining four being composite samples taken from each of the four surface impoundments. Due to extremely cold weather conditions, two of the surface impoundments have frozen over making composite sampling of those two surface impoundments virtually impossible. I advised Mr. Morse of this situation and he had suggested that we forego the composite sampling of those two impoundments and obtain grab samples from them.

Ms. Barbara L. Bush Office of Solid Waste (WH-562) U. S. Environmental Protection Agency Washington, D. C. 20460

Re: Delisting Petition #0533

The sampling was performed on February 7, 1984. Composite samples were obtained from surface impoundments Numbers 3 and 4 and grab samples were taken from surface impoundments Numbers 1 and 2. A composite of the clarifier blowdown was obtained from grab samples taken during the blowdown periods.

You will also note that along with the TOC analysis, the samples were also tested to determine the presence of the metal Thallium. Though Thallium is not listed as an EP Toxic Metal, a review of the Material Safety Data Sheets has alerted us to the fact that one of the products in use, Isobrite 607 used in our cyanide copper plating solution as an additive, contains small amounts of Thallium Carbonate. Each sample was analyzed for Total Thallium based upon the dosage rate of Isobrite 607, (one-third gallon per day added to a 5000 gallon plating tank with a small dragout rate), we would estimate that the amount of Thallium that may enter the sludge would be extremely small.

I am also including a summary sheet with this letter, detailing the analyses performed and the results of those analyses.

I will once again remind both you and Mr. Morse that the Stanley Tools-Fowlerville facility has received a request from EPA Region V-for the submission of their Part B Permit application. The submission date is targeted for July 15, 1984.

I hope this additional information will assist you in completing your review of the petition in a timely manner. Should any additional information regarding this petition be needed, please contact me as soon as possible.

Sincerely,

William J. Guerrera Environmental Chemist

Stanley Laboratory 1309 Corbin Avenue

New Britain, CT 06053

(203) 225-5111 - Ext.5211

William J. Gurrero

Ms. Barbara Bush

RE: Delisting Petition #0533

# Analysis Data:

Sample #	Туре	TOC	mg/l	Thallium (Tl)
1000	Blowdown Composite	1,400		2.0*
1001	Lagoon #1, Grab	5		2.0*
1002	Lagoon #2, Grab	3,100		2.0*
1003	Lagoon #3, Composite	1,300		2.0*
1004	Lagoon #4, Composite	100		2.0*

<sup>\* -</sup> Not detected, concentration found to be lower than the detection limit given.

The analytical data presented on this page has been developed by Baron Consulting Company. The Thallium analysis was performed on a Perkin-Elmer 503 Atomic Absorption Spectrophotometer. The Thallium values were quantified by the method of standard additions. The TOC analysis was performed in accordance with Method 415.1 described in EPA-600/4-79-020 STORET No. 00680.



# THE STANLEY WORKS

Since 1843

P.O. Box 1800 NEW BRITAIN, CONNECTICUT 06050

(203) 225-5111

October 21, 1983

Mr. William D. Ruckelshaus Administrator U.S.Environmental Protection Agency Washington, D. C. 20460

RE: STANLEY TOOLS - FOWLERVILLE EPA ID #MID099124299

Dear Mr. Ruckelshaus:

The following petition for the delisting of electroplating wastewater treatment sludge, EPA Hazardous Waste Code Number F006, is being submitted to you by The Stanley Works Corporate Laboratory. The Stanley Works is the owner of the Stanley Tools facility located in Fowlerville, Michigan and herein identified as Stanley Tools - Fowlerville.

The facility's electroplating operations are cyanide copper, watts nickel, and hexavalent chromium. The rinse waters from these operations are treated in tanks. Vibratory finishing waste from the deburring of zinc base die-casts is discharged to the surface impoundment system for settling.

The F006 waste is being generated in a clarifier at the Fowlerville facility. The underflow from the clarifier is directed to surface impoundments for both sludge storage and increased solid-liquid separation. The supernatant liquid from the surface impoundments is directed to a receiving stream and discharged under the guidelines of an NPDES Permit.

This petition will be submitted in two parts. The first part will provide the requirements pursuant to Title 40CFR Part 260.22 with the exception of the cyanide analysis, and the determination of the oil and grease content of the sludge.

Mr. William D. Ruckelshaus U. S. Environmental Protection Agency

RE: STANLEY TOOLS - FOWLERVILLE EPA ID #MID099124299

The presence of a sulfide compound contaminant in the sludge samples has interfered with the cyanide determination which resulted in non-repeatable results. When a suitable method to determine cyanide in the presence of sulfide was obtained, the sludge samples had aged thus altering the concentration of the cyanide in the sludge.

As discussed in a phone conversation with Mr. Myles Morse on August 31, 1983, fresh samples of the underflow from the clarifier before discharge to the surface impoundments will be taken. These samples would be representative of our sludge generation, at a worst case condition since the sludge would not be allowed to further settle and age in the surface impoundments. The samples will be analyzed for Total, Amenable, and Leachable Cyanide, as well as oil and grease content. The results of these analyses will be submitted in the second part of the delisting petition.

The sludge exhibited some unusual characteristics when subjected to the EP Toxicity Extraction Procedure. In all cases, the maximum amount of acetic acid for the weight taken had to be added to the sample and still the resultant pH never dropped near the pH 5.0 range. A composite sample of all the samples taken was made up and tested. The extract metal analyses from the composite sample are lower than the statistical average that would be expected from the individual sample extract analysis. It appears that compositing causes a reaction to occur which binds the metals therefore making them less mobile.

The delisting petition certification will be signed by a Corporate Vice President. I greatfully request that any inquiries regarding this petition be referred to me.

Sincerely,

THE STANLEY WORKS

William J. Guerrera Environmental Chemist

William J. Guerren

Stanley Laboratory 1309 Corbin Avenue

New Britain, CT 06053

(203) 225-5111 - Extension 5211

PETITIONER:

OWNER:

THE STANLEY WORKS

195 LAKE STREET

NEW BRITAIN, CONNECTICUT 06050

OPERATOR:

STANLEY TOOLS - FOWLERVILLE

425 FRANK STREET

FOWLERVILLE, MICHIGAN 48836

### STATEMENT OF INTEREST AND NEED:

The Stanley Tools facility, in Fowlerville, Michigan, a Division of The Stanley Works, is primarily involved in the manufacture, plating and finishing of zinc base die-castings. The facility treats cyanide, hexavalent chromium and nickel electroplating rinse waters. The underflow from the clarifier is directed to the first of four settling lagoons which are in series. The bulk of the settling occurs in Lagoon #1 while further settling is achieved in the remaining lagoons. The final discharge from Lagoon #4 is directed to a receiving stream under the guidelines of an NPDES Permit. The State of Michigan is one of several areas throughout the United States with the lack of sufficient hazardous waste disposal capacity.

Of particular interest to The Stanley Works is that the electroplating wastewater treatment sludge generated at the clarifier and stored in the surface impoundments be removed from the hazardous waste listing for the following purposes:

- 1. The result of the EP Toxicity Test indicate that the hazardous waste constituents in the sludge are below the hazardous criteria for a toxic waste.
- 2. The present method of sludge handling, and transporting for final disposal, is extremely expensive and has overburdened the facility's operating budget.
- 3. The dewatered sludge is capable of being accepted by an approved solid waste landfill.

## PROPOSED ACTION:

That the EPA exclude the Stanley Tools - Fowlerville Division's electroplating wastewater treatment sludge from Sub Part D, 40CFR Part 261.31 which presently lists EPA Hazardous Waste Code Number F006, Wastewater Treatment Sludges from Electroplating Operations.

The following information is supplied pursuant to 40CFR Part 260.22:

- 1. Name and Address of the Laboratories performing the testing.
  - a) The Stanley Works
    Corporate Laboratory
    1309 Corbin Avenue
    New Britain, CT 06053
  - b) TRC Environmental Consultants 800 Connecticut Blvd. East Hartford, CT 06108
- 2. Name of person sampling and testing the waste.
  - a) Sampling Reza Rejaei, Stanley Tools Fowlerville

The lagoon sampling and sample compositing was performed by Mr. Rejaei on March 17, 1983. Mr. Rejaei is employed as a chemist by the Stanley Tools facility in Fowlerville, Michigan and holds a Masters degree in Engineering Management. The sampling was conducted in accordance with the lagoon sampling methodology as discussed in a letter to Mr. Morse on March 15, 1983. A copy of the letter is enclosed for reference. A dipper sampler was used to collect the samples from the quadrants A minimum of four grab samples were taken from each quadrant. Approximately three-quarters of a gallon was collected with each sampling pass. The dipper was pulled through the sludge from top to bottom to obtain a representative cross section sample. The samples were collected in a bucket and composited and one gallon was poured off and placed in a nalgene bottle and labeled with proper identification, the sampler was then cleaned and the procedure was repeated on another quadrant. The samples were sent to the Corporate Laboratory for analysis.

b) Testing - William J. Guerrera, The Stanley Works Laboratory

Mr. Guerrera was responsible for the sample handling, percent solids determination, and performing the EP Toxicity Extractions on the samples. He is an Environmental Chemist in the Environmental Science Section of The Stanley Works Corporate Laboratory and holds a Bachelors Degree in Chemistry and an Associates Degree in Chemical Engineering with over six years environmental control experience.

Philip L. Talarico, The Stanley Works Laboratory

Mr. Talarico was responsible for the metals analysis by Atomic Absorption Spectroscopy, and the wet chemical analysis for the cyanide determinations. He is an Analytical Chemist for The Stanley Works Corporate Laboratory, and holds a Masters Degree in Science with over twenty-eight years analytical chemistry experience.

c) Outside Testing - Margaret Flanagan, Ann Levine, TRC Environmental Consultants.

TRC Environmental Consultants were contacted to perform metals analysis on metals not routinely analyzed by The Stanley Works Laboratory. A composite sample made up of all the samples taken from the lagoons was sent to TRC for the determination of total arsenic, mercury, and selenium in the sludge. Since these materials are not used in our process, analysis for total metals will be performed. If the analysis indicates that the concentration of the constituents is sufficient enough to yield a leachable metal concentration greater than the allowable EP Toxicity limits, an EP Toxicity Extraction will be performed upon the sludge and the concentration of the suspect metals in the extract will be determined.

The attached resumes are those of the analysts employed by TRC who performed the analysis on the sludge. TRC Laboratory is certified by the Connecticut State Department of Health as an Approved Public Health Laboratory (PH-0426).

#### MARGARET FLANAGAN

#### EDUCATION

1972, B.A. Saint Joseph College, West Hartford, Connecticut, Chemistry

Graduate courses at Central Connecticut State College and University of Hartford

Completed the State of Connecticut Director of Laboratory Qualifying Exam

#### SUMMARY OF EXPERIENCE

Ms. Flanagan is an Senior Chemist - Inorganic Section in TRC's Chemistry Laboratory. She participates in the analysis of environmental samples using instrumental and wet chemical methods. She is specifically working on the development of new analytical procedures using the Perkin-Elmer 560 Atomic Absorption unit which is equipped with auto samplers, data printer, metal hydride generator and HGA furnace. She has performed a variety of chemical analyses on a range of projects. These include the analysis of leachate from flyash for a utility (arsenic, selenium, chromium, nickel, calcium, zinc, antimony, molybdenum, boron, aluminum, and manganese) and effluent from a sewage treatment facility (solids, BOD, COD - by the micro-ampulmatic procedure, nitrogen, nitrate, oil and grease, cyanide, and a variety of heavy metals). She has conducted the analysis of hi-vol filters for vanadium, lead, bromide, iron, TSP, and sulfate using the methyl-thymol blue auto-analyzer method. Sludge samples have been analyzed for heat content, sulfur and metals such as mercury and chromium. She performs the EPA emission analytical methods for particulate, SO2 and NOx.

Ms. Flanagan has participated in projects requiring on-site chemical analysis. These include a tracer study involving the dispersion of sulfur dioxide using gas chromatography and colorimetric procedures. She has assisted in the determination of the efficiency of organic vapor emission control in the chemical industry. Another program was conducted for the EPA to determine the emissions from fertilizer plants. For this project, she conducted and compared methods of analysis involving standard colorimetric procedures and instrumental methods. She also modified procedures for the particular interferences encountered.

Prior to working at TRC, Ms. Flanagan was a manager of an electroplating analytical laboratory which performed wastewater analysis and developed new analytical procedures for the plating solutions using atomic absorption methods. She also participated in the development of analytical procedures to determine the quality of photocopier products.

#### PROFESSIONAL AFFILIATIONS

American Chemical Society

#### ANNE M. LEVINE

#### EDUCATION

1981 Kevex Training Course - X-ray Energy Spectrophotometry

1978 Perkin Elmer Training Course - Atomic Absorption Spectrophotometry

1977, B.S. Trinity College, Hartford, Connecticut, Chemistry

#### SUMMARY OF EXPERIENCE

Ms. Levine is a Chemist in TRC's Chemistry Laboratory. Her responsibilities include the chemical analysis of water, coal, and ash samples. She works with a variety of instrumentation including the atomic absorption spectrophotometer, UV/visible spectrophotometer, infrared analyzer, and others. She is familiar with most standard procedures recommended by EPA, and ASTM for pollutant analysis.

Ms. Levine has also participated as a TRC project team member on various programs. In this role, she provides project managers with chemistry-related knowledge and skills. In a recent project, she performed metal analyses on the atomic absorption spectrophotometer for coal, fly ash and bottom ash samples. She has also participated in a water quality monitoring program for a utility plant project in which she analyzed pollutant metals in coal pile runoff samples. She determined the matrix interferences and utilized methods of chemically treating these samples to eliminate such interferences. In a hazardous waste management program, she researched literature on attenuation of metals in ground water as related to hazardous waste dumping, and provided the chemistry of these metals as explanation of reactions in the soil.

Prior to joining TRC, Ms. Levine was a quality control chemist for Pratt & Whitney Aircraft. Her main responsibilities were the programming, maintenance, and procedural analysis of a computerized Kevex X-ray Energy Spectrophotometer. Prior to that assignment, she placed the computerized Jarrell-Ash Direct Reading Spectrophotometer on line as a simultaneous multi-element analyzing tool for complex metal alloys. She de-bugged many wet chemical procedures, as well as wrote manual sections for their final established procedures. Through this experience Ms. Levine has gained extensive knowledge regarding quality control and quality assurance of laboratory analysis work.

While attending Trinity College, Ms. Levine completed an independent study research project entitled "The Applicability of Polarography and Atomic Absorption Spectrophotometry in Elemental Analysis of Europium and Ytterbium in Binary Hydride Compounds".

#### PROFESSIONAL AFFILIATIONS

American Chemical Society

#### 3. Testing Dates:

a) EP Toxicity Extraction for Metals and Percent Solids Data:

3/22/83	4/13/83
3/23/83	4/19/83
3/29/83	4/21/83
4/12/83	

b) Total Metals Analysis and Leachate Analysis by Atomic Absorption Spectroscopy:

3/29/83	4/25/83	5/18/83	7/8/83	8/4/83
4/6/83	4/26/83	6/6/83	7/11/83	8/5/83
4/11/83	4/29/83	<b>6</b> /20/83	7/12/83	8/9/83
4/17/83	5/2/83	6/22/83	7/13/83	
4/18/83	5/5/83	7/5/83	7/14/83	
4/19/83	5/10/83	7/7/83	8/3/83	

4. Location of the Generating Facility:

425 Frank Street Fowlerville, Michigan 48836

5. Description of Manufacturing Processes, Raw Materials Used and Assessment of Operations:

The Stanley Tools - Fowlerville facility is primarily involved in the manufacture, finishing, and plating of zinc base die-castings. The facility operates under the primary Standard Industrial Classification Code Number 3428. Other operations include processes identified under S.I.C. Code Number 3400. The electroplating process discharges are regulated by the NPDES Program.

The raw materials producing the wastewater for treatment are rinse waters following the process solutions, and zinc vibratory finishing waste discharges. The primary process solutions are copper, nickel and chromium. Presently, the chromium plating solution that enters the rinse water as drag-out from the chromium plating process is recovered. Process solutions which are not reclaimed are treated in tanks at the facility. The sludge generated is stored in surface impoundments to achieve settling and further separation of solid and liquid. The top water from the surface impoundments is directed to a receiving stream under the guidelines of an NPDES Permit.

#### PROCESS DESCRIPTION:

a) Deburring of zinc die-castings:

Zinc die-cast parts are trimmed and then placed in vibratory finishing equipment. Preform cone-shaped media and liquid burnishing compounds are added to achieve deburring. The parts are agitated for 1/2 hour. The parts are then rinsed and dried with the washings directed to a containment sump.

## b) Buffing:

Following the deburring process, the parts proceed to a buffing operation where the parts are buffed to yield a highly reflective surface.

# c) Plating Operations:

The buffed die-cast parts are then racked and transferred by a conveyor line to the plating area. The plating process involves the following procedures with subsequent rinses:

1) Alkaline Clean -

A mild alkaline soap cleaner SU-486 manufactured by MacDermid, Inc.

2) Alkaline Clean -

A mild alkaline cleaner P-1777 manufactured by MacDermid, Inc.

3) Electro Clean -

A mild alkaline electrocleaner EN-1751 manufactured by MacDermid, Inc.

4) Acid Dip -

5% Sulfuric Acid.

5) Copper Strike -

Contains sodium cyanide, caustic soda, and copper metal.

6) Copper Plate -

Contains sodium cyanide, caustic soda, and copper metal.

7) Electro Clean -

A mild alkaline electrocleaner B-920 manufactured by Benchmark Company.

- 8) Acid Dip -
  - 2% Sulfuric Acid.
- 9) Nickel Plate -

Contains nickel sulfate, nickel chloride, boric acid, and sulfuric acid.

10) Chrome Activator -

A 2% Chromic Acid Solution.

11) Chromium Plate -

Contains chromic acid and sulfuric acid.

d) Rack Stripping Operation:

The racks used to hold the parts during the plating operation have to be stripped before they can be reused. The stripping operation produces a better contact between the parts and the rack thus increasing the conductivity when the parts are immersed in the plating solution. The stripping process is as follows:

1) Nitric Acid Stripper -

60% Nitric Acid, and 6% Acid Activator Clepo 569N manufactured by Frederick Gumm Chemical Company.

2) Neutralization Rinse -

A soda ash solution used to neutralize acid drag-in.

6. General Description of Wastewater Treatment Operations:

The rinses following plating processes and any spills of process solutions are collected in separate tanks in the plating area. From these tanks, they are pumped to various treatment areas at the facility, for treatment. Details of the treatment methodology are as follows:

- 1) Nitric acid solution from the rack stripping operation is combined with the first alkaline cleaner in the plating process line. The combined solution is then shipped off-site for treatment and disposal.
- 2) The alkaline cleaner, electrocleaner, and acid dip solution prior to the copper plating process are pumped to the clarifier. Lime and caustic soda are added for pH adjustment and a polyelectrolyte is added to aid precipitation.
- Cyanide rinses and the electrocleaner after the copper plating process, are pumped to the cyanide retention tank for cyanide treatment. Caustic soda is added for pH adjustment; sodium hyprochlorite is added to oxidize the cyanide; sodium bisulfite is added for the treatment of residual chlorine; sodium hydrosulfite is added for the reduction of chromium which is slowly leached out of the racks by the copper plating solution; calcium chloride, ferrous sulfate and aluminum sulfate are added for the treatment of copper; and finally, a polyelectrolyte is added to aid precipitation. The treated wastewater is then pumped to the clarifier for pH adjustment and further precipitation.
- 4) The acid dip, prior to the nickel plating bath, is pumped to the clarifier unit for pH adjustment use.
- 5) Nickel plating rinse waters are pumped to the clarifier for pH adjustment and precipitation.
- 6) Chromic acid solutions and rinse waters are pumped to the chrome recovery system. The chrome recovery system is now a closed loop system. We recover and regenerate hexavalent chromium through the use of a ChromeNapper manufactured by Innova, Inc. The use of this recovery equipment has significantly reduced our need to treat chromium in our discharge.

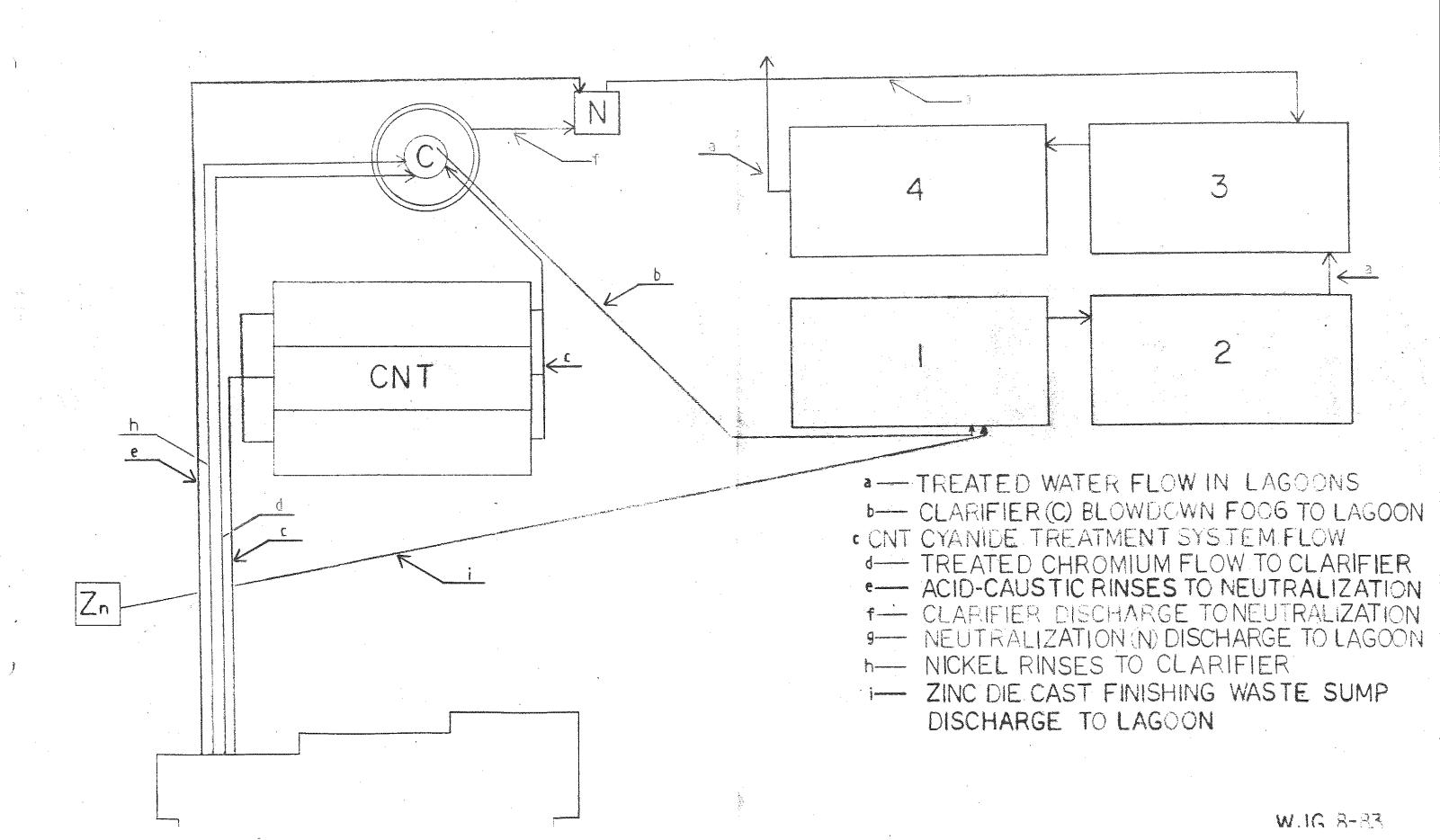
- 7) The zinc vibratory finishing waste is pumped from the containment sump to Lagoon #1 for settling.
- 8) All metal free-rinses are pumped to the neutralization basin for pH adjustment.
- 9) The treated wastewater overflow from the clarifier discharges to the neutralization basin for pH adjustment, then is gravity fed to Lagoon #3. The underflow from the clarifier (metal hydroxide sludge) discharges to a holding tank, then is pumped to Lagoon #1 for settling. There are four lagoons connected in series. The clarifier underflow flows gradually from Lagoon #1 through Lagoons #2 and #3 into #4 and is finally discharged to the receiving stream.
- 10) The metal hydroxide sludge (F006) remains in the lagoons and is allowed to accumulate for a period of one year. At the end of a year's time, the sludge is pumped from the lagoons into tanker trucks and sent for disposal.

#### THE ESTIMATED SLUDGE GENERATION IS AS FOLLOWS:

AVERAGE	MONTHLY	110.2	TONS
AVERAGE	YEARLY	1322	TONS
MAXIMUM	MONTHLY	119.9	TONS
MAXIMUM	YEARLY	1439	TONS

A flow schematic of the treatment process is included with the petition.

# STANLEY TOOLS -FOWLERVILLE EPA ID NO - MID 099124299 TREATMENT SYSTEM FLOW SCHEMATIC



7. Discussion of Factors Delineated in Criteria for Listing Hazardous Waste:

Based on the established drinking water standards and the results of the EP Toxicity Extraction Procedure for Metals, the sludge generated at Stanley Tools - Fowlerville is non-hazardous even though hazardous waste constituents are treated. The metal characteristics of the sludge are far below the allowable concentrations for a toxic waste. The results show that the extract solutions meet the drinking water standards within the sensitivity of the test procedures. As a result of the treatment process, the metals are basically held in an immobile form and are not capable of posing a substantial present or potential hazard to human health or the environment when treated, stored, transported, or disposed of, or otherwise managed.

## 8. Sampling Methodology:

As discussed earlier under 2a, Sampling, the lagoons were sampled according to the sampling methodology devised by Mr. Morse, a copy of which is included in this petition. The sample dipper was constructed from a one-gallon plastic bottle with the neck cut off. The bottle was attached to a long wooden pole. The dipper was pulled through the sludge from top to bottom to obtain a representative cross section sample.

9. Sample Handling and Testing Methodology:

The samples were kept in sealed nalgene bottles at all times. At the time of testing, each sample was well mixed with a paddle mixer, and a portion of the sample slurry was drawn off using Tygon tubing and a vacuum line. The slurry was collected in pre-weighed 500 ml nalgene bottles which were covered to prevent evaporation losses. In all cases, over 100 grams of slurry was initially taken. A portion of the sample was tested for percent non-filterable solids, gravimetric method as described in, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Method 1310, Section 7.0.

The pH of the slurry was also measured at this time.

The remaining sample portions were subjected to the E.P. Toxicity Test Extraction Procedure as outlined in, "Test Methods for the Evaluation of Solid Waste Physical/Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Method 1310. A Millipore Hazardous Waste Filtration Unit using a pre-weighed  $142\,$  mm,  $0.45\,$  micron filter pad and nitrogen as the pressurizing gas was incorporated to achieve the solid-liquid separation. The liquid portion of the samples were collected in glass 500 ml Erlenmyer flasks and were stoppered immediately after the liquid flow ceased and the pressurizing nitrogen gas evolved from the filter unit. The liquid fractions from the initial separation were stored at 4°C for future usage. The remaining solid portion was evaluated for particle size and then the solid along with the filter pad and the support screen were placed in a covered Petri dish and the solids were immediately weighed to the nearest 0.1 mg. The solid samples were then introduced into a suitable extractor along with sixteen times their weight of deionized water. The agitation was started and the pH of the solution was measured. In all cases, the initial pH measured was greater than pH 5.0  $\pm$  .2, therefore the pH was decreased using 0.5N acetic acid. After each acid addition, a 20 second equalization time was allowed and then the pH was recorded. Once again, in all cases, the maximum amount of 0.5N acetic acid (4 mls/gm of solid charged to the extractor) was added to the samples and the resultant pH never dropped near the pH 5.0 + .2 range.

The agitation was continued for a twenty-four hour period during which the pH was measured. At the end of the twenty-four hour period, the pH was again measured and the agitation was stopped. The extracted solution was then introduced into a Hazardous Waste Filtration Unit and the solid and liquid portions were separated using a 142 mm, 0.45 micron filter pad and nitrogen gas for pressurization.

The resultant liquid was collected in a 1000 ml glass Erlenmyer flask and combined with the liquid obtained from the initial separation. The combined solution was preserved for metals analysis to a pH of less than 2 using nitric acid. The sample was analyzed for E.P. Toxic Metals by Atomic Absorption Spectroscopy, as outlined in the, "Test Methods for the Evaluation of Solid Waste, Physical/-Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Section 7.0.

Since the waste is both generated and disposed of in the State of Michigan, the elements copper and zinc were also analyzed since they are considered by the State of Michigan as EP Toxic Metals.

# 10. Testing Results:

The results of the E.P. Toxic Metals analysis analyzed by Atomic Absorption Spectroscopy using the methods of standard additions for quantification of the species concentration and the results of the percent solids determination are tabulated on the following pages. individual quadrant was analyzed separately for both total and leachable metals, also a composite sample was made up from all the samples taken and analyzed for both total and leachable metals. The total metal samples were reported in both percent by weight (on a dry weight basis) and in mg/l. Preliminary scans were run on each sample, the elements which gave absorption readings corresponding to concentrations far below the allowable limits were not quantitated by the method of standard addition techniques. The Atomic Absorption Unit was calibrated using both commercially prepared high purity atomic absoprtion cation standards and in-house prepared cation standards utilizing a metal or of the highest commercially available purity.

The sludge samples were prepared for analysis following the sample digestion methods outlined in, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Method 3050. All acid reagents used were of the trace metals analysis grade purity with the exception of the acetic acid which was reagent grade purity. liquid samples were prepared for analysis following the sample digestion methods outlined in, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Method 3010. All glassware used was acid washed and rinsed prior to usage.

Sample preparation and analysis procedures performed by TRC Environmental Consultants (Outside Testing Laboratory) have been documented on their reports, and are in accordance with the testing references incorporated by Title 40 CFR Part 260.11 referenced in Title 40 CFR Part 261 Appendix III.

- 11. Names and Model Numbers of the Instruments Used:
  - a) TRC Environmental Consultants
    - Perkin Elmer Model 560 Atomic Absorption Spectrophotometer, equipped with background correction, and an electrodeless lamp power supply, and HGA-2200 furnace and a MHS-10 Mercury Hydride System.
  - b) Stanley Works Corporate Laboratory
    - Perkin Elmer Model 2380 Atomic Absorption Spectrophotometer, equipped with a background correction system.
    - 2) Mettler H31 Electronic Balance with sensitivity to 0.1 mg.
    - 3) Ainsworth Model 10N Electronic Balance with sensitivity to 0.1 mg.

- 4) Orion Model 501 Digital pH Meter.
- 5) Millipore Hazardous Waste Filtration Unit Catalog No. YT30142HW.
- 6) Millipore 0.45 Micron Membrane Filters, 142 mm Diameter, Catalog No. HAWP14250.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and, that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete, except for the cyanide analysis and the determination of the oil and grease content of the sludge which will be submitted in the second part of the petition. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sincerely,

THE STANLEY WORKS

Richard H. Ayers Group Vice President



# THE STANLEY WORKS

Since 1843

P.O. Box 1800 NEW BRITAIN, CONNECTICUT 06050

(203) 225-5111

March 15, 1983

Mr. Myles Morse Office of Solid Waste (WH-565) U.S.Environmental Protection Agency Washington, D.C. 20460

Re: Stanley Tools, Powlerville, MI EPA I.D. # MID-099124299

Dear Mr. Morse:

As per our phone conversation of March 10, 1983, I am sending you this letter to confirm the lagoon sampling methodology that we discussed. To summarize our conversation, our Michigan Tools facility is involved in the fabrication, plating, and finishing of zinc-die castings. The facility treats cyanide, hexavalent chromium, and nickel electroplating rinse waters in tanks. The blow down and underflow from our clarifier is directed to the first of four settling lagoons which are in series. The bulk of the solids settling occurs in Lagoon \$1 while further settling is achieved in the remaining lagoons. The final discharge from Lagoon \$4 is directed to a receiving stream under the guidelines of an NPDES Permit. The F006 waste remains in the lagoon for a period of time of about one year, before the lagoons are pumped down and the waste is sent for disposal.

The average dimensions of the lagoons are 60' wide x 80' long x 4' deep. We discussed that in order to obtain a representative sample from the lagoons, lagoons #1 and #2 should be divided into quadrants while lagoons #3 and #4 divided in two sections. From each quadrant or section, at least four grab samples will be collected. The samples will be taken in a manner that will cross-section the area of the quadrant or section being sampled. Each grab sample will be a representative sample of the buildup of sludge in the quadrant or section. The grab samples will then be composited and one composite sample from each quadrant or section will be obtained. Please see attached drawing.

Page 2

Mr. Myles Morse

Re: Stanley Tools, Powlerville, MI

EPA I.D. # MID-099124299

The composite samples will be analyzed for total metals along with total and amenable cyanide. The extract from the EP Toxicity Test will be analyzed for leachable metals.

If, in your opinion, the sampling methodology discussed above meets the requirements of 260.22%, please sign and date below and return a copy for our records. If the plan does not meet the requirements of 260.22%, please contact me at your earliest convenience.

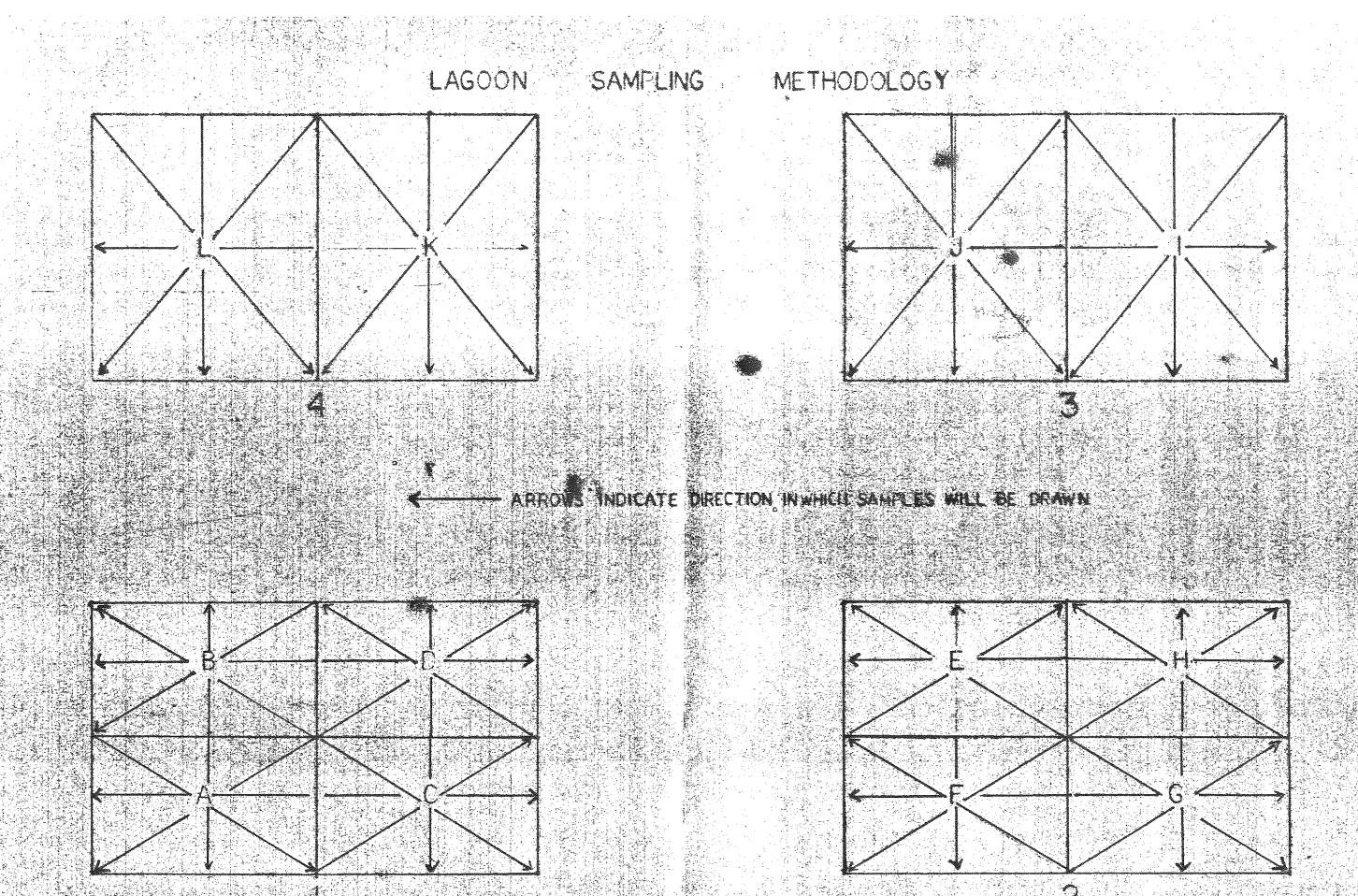
Thank you for your cooperation with this matter.

Sincerely,

THE STABLEY WORKS

William J. Guerrera
Environmental Chemist
Stanley Laboratory
1309 Corbin Avenue
New Britain, CT 06053

. . .



The analytical data presented on the following pages has been developed by TRC Environmental Consultants. A total metals analysis for Arsenic, Mercury, and Selenium was performed by TRC on sample #1299 which corresponds to composite sample M. The results of the analyses indicate that the levels of Arsenic, Mercury, and Selenium, on a % dry weight basis are below the detection limits given. Arsenic and Selenium were not analyzed in the leachate since their levels from the total metals analysis were so low that if all the metals were leachable, they would still yield levels less than the E.P. Toxicity limits.

An exception was made for mercury, since signal supression from matrix interference yielded a level of mercury in the total metals analysis which could be E.P. Toxic, mercury was analyzed in the leachate. The leachate analysis indicated that the mercury content was significantly less than the E.P. Toxic limits.



April 29, 1983

Mr. William Guerrera Stanley Laboratory The Stanley Works New Britain, CT 06053

Dear Bill:

TRC Project 2150-B51-09 P.O. 27726L

The results of the analysis by Method of Addition of Sludge sample #1299 are as follows:

% solids 3.16% Arsenic non-detected <2.72  $\mu$ g/g (dry weight basis) Mercury non-detected <5.89  $\mu$ g/g (dry weight basis) Selenium non-detected <5.44  $\mu$ g/g (dry weight basis)

The sample was prepared and analyzed using methods given in Standard Methods for the Examination of Water and Wastewater 15th Edition, 1980 APHA-AWWA-WPCF and "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020, March 1979). Standard Methods Procedure 302H "Digestion of Sludge with High or Refractory Organic Content" was followed for the preparation for Arsenic and Selenium analysis. The sludge was prepared for mercury analysis by an aquaregia-permanganate digestion similar to EPA Method 245.5. Matrix effects caused suppression of the signal for the three metals.

Arsenic was analyzed by the EPA Furnace Method 206.2. First the original digestion solution was used for the Method of Addition procedure but results were inconsistent due to the sample matrix and/or acid concentration. The sample was diluted five-fold and then analyzed without interference or suppression of the signal. The result, calculated by linear regression using three points from the Method of Addition, was below the limit of detection.

Mercury was analyzed by cold vapor generation following the Perkin-Elmer procedure for the MHS-10 Mercury-Hydride System. The sample matrix caused approximately 70-fold suppression of the mercury signal. The result, calculated by linear regression using four points from the Method of Addition, was below the limit of detection.

Selenium was first analyzed by hydride generation. However, severe suppression of the signal occurred and this method was abandoned and EPA Method 270.2 was used instead. A five-fold dilution of the sample was used for Method of Addition which still gave about 20% suppression of the signal. The result, calculated by linear regression using three points of the Method of Addition was below the limit of detection.

April 29, 1983 TRC Project 2150-B51-09

Mr. William Guerrera The Stanley Works

-2-

I am enclosing copies of the notebook pages and charts for this sample. If you have any questions about this analysis please do not hesitate to call.

Sincerely,

TRC ENVIRONMENTAL CONSULTANTS, INC.

Margaret D. D. Canagan

Margaret F. Flanagan Senior Chemist

MFF/jjs Enclosures

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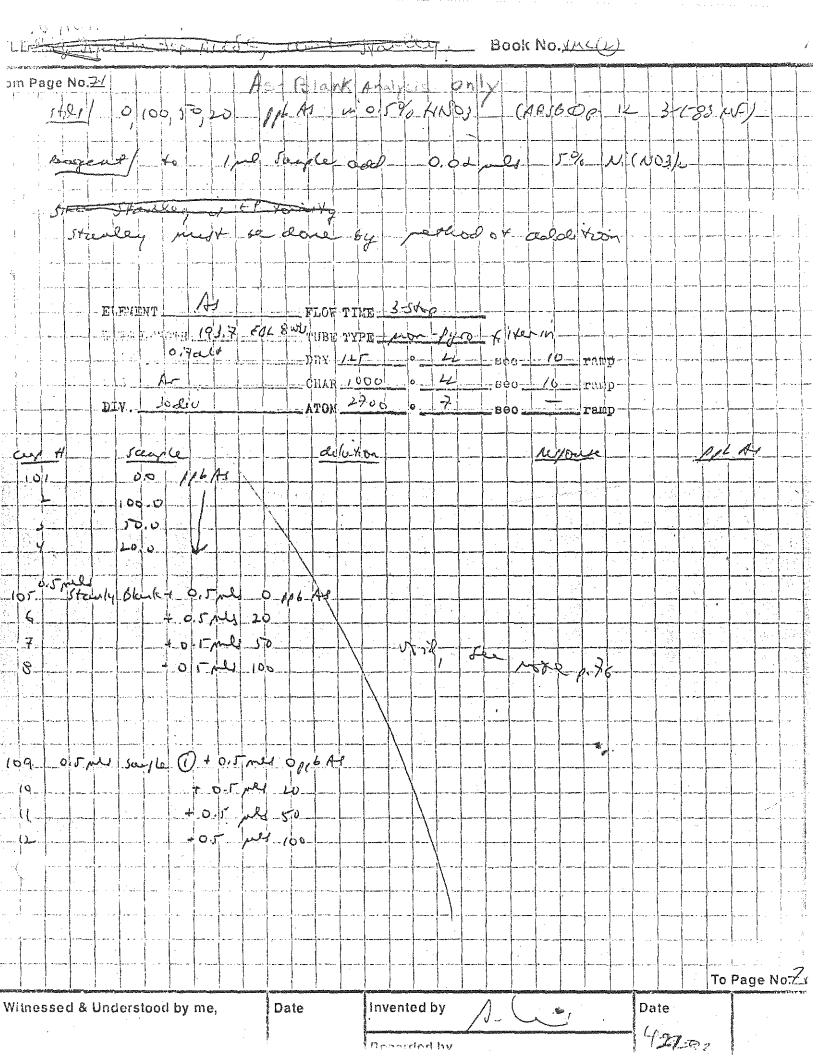
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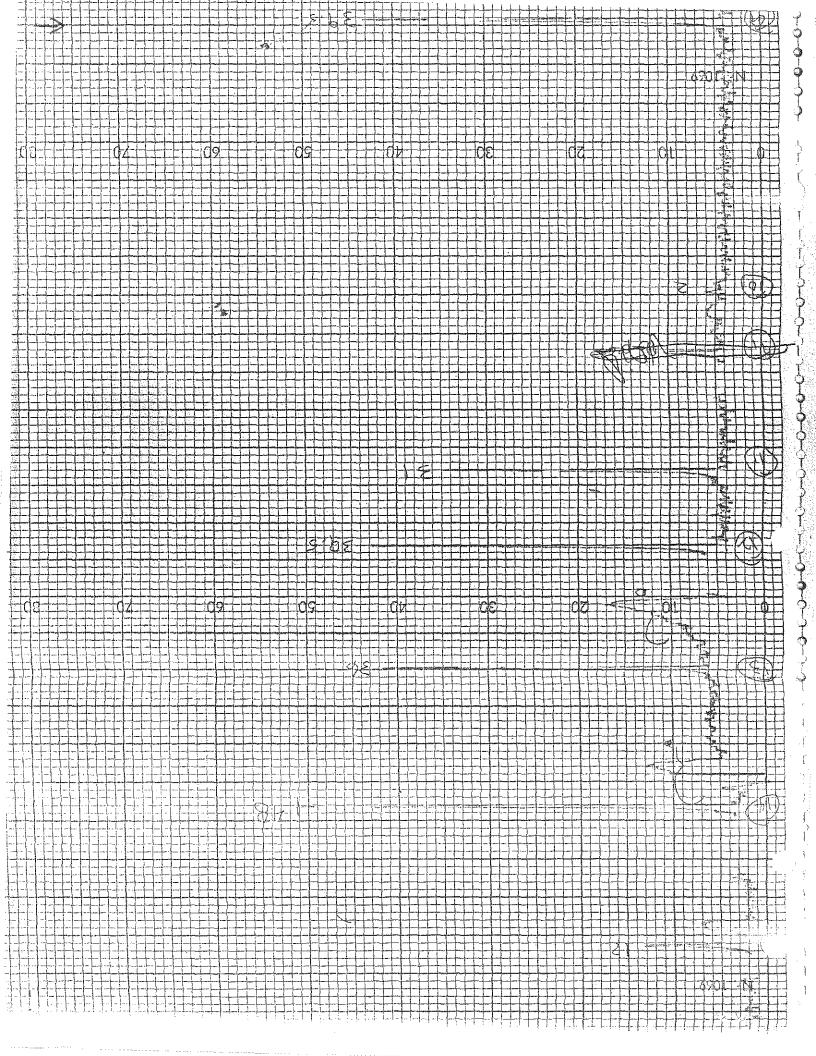
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August 16, 1983

Mr. William Guerrera Stanley Laboratories The Stanley Works New Britain, Connecticut 06053

Re: TRC Project 2150-B51-15 P.O. C 28684 L

Dear Bill:

The concentration of mercury in EP toxicity Leachate #1299 is 0.0027 µg/ml. The sample and lab blank were analyzed by method of additions on August 9th by Anne Levine. Mercury was analyzed by the Cold Vapor Technique using Perkin-Elmer Method EN-l for the MHS-10 Mercury Hydride System on the Perkin Elmer 560 Atomic Absorption Unit. Each response was recorded and peak height was used for the calculations. The responses were corrected for the blank and then linear regression was used to calculate the result. X was the nanograms added to the sample and y was the blank corrected peak height. The x-intercept equalled the ng mercury in the aliquot analyzed. I have enclosed copies of the notebook pages and chart.

If you have any questions about the analysis please do not hesitate to call.

Very truly yours,

TRC ENVIRONMENTAL CONSULTANTS, INC.

Margaret F. Flanagan

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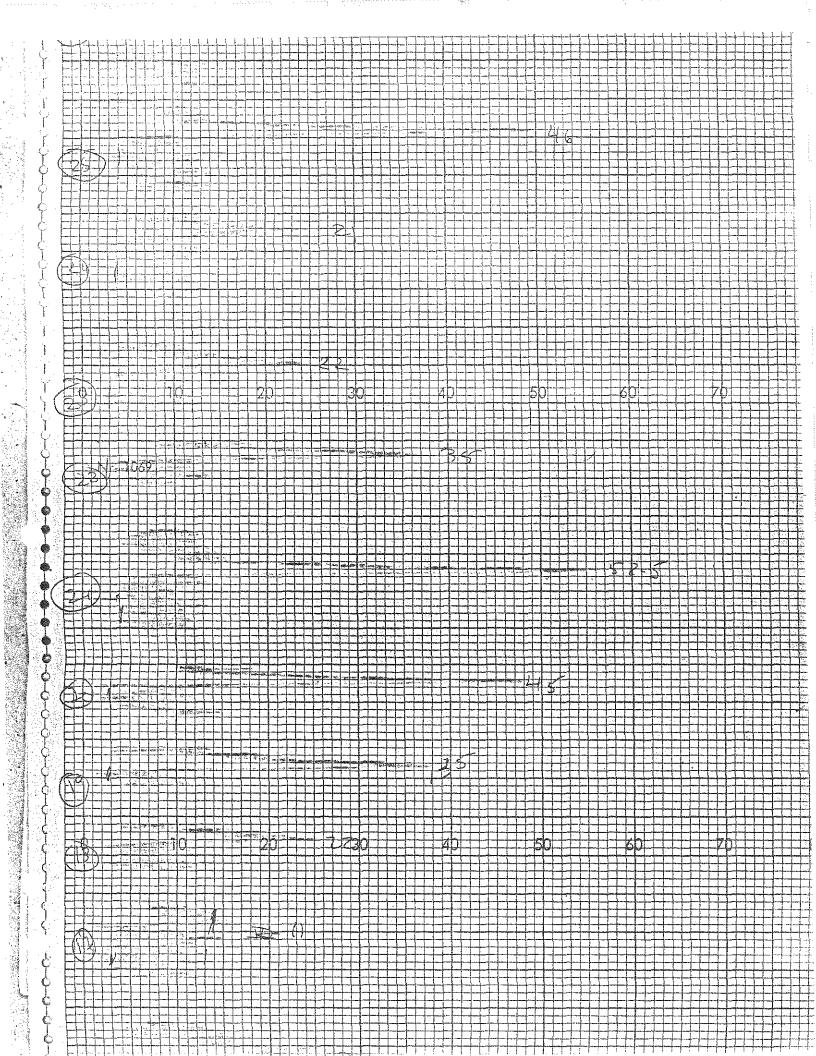
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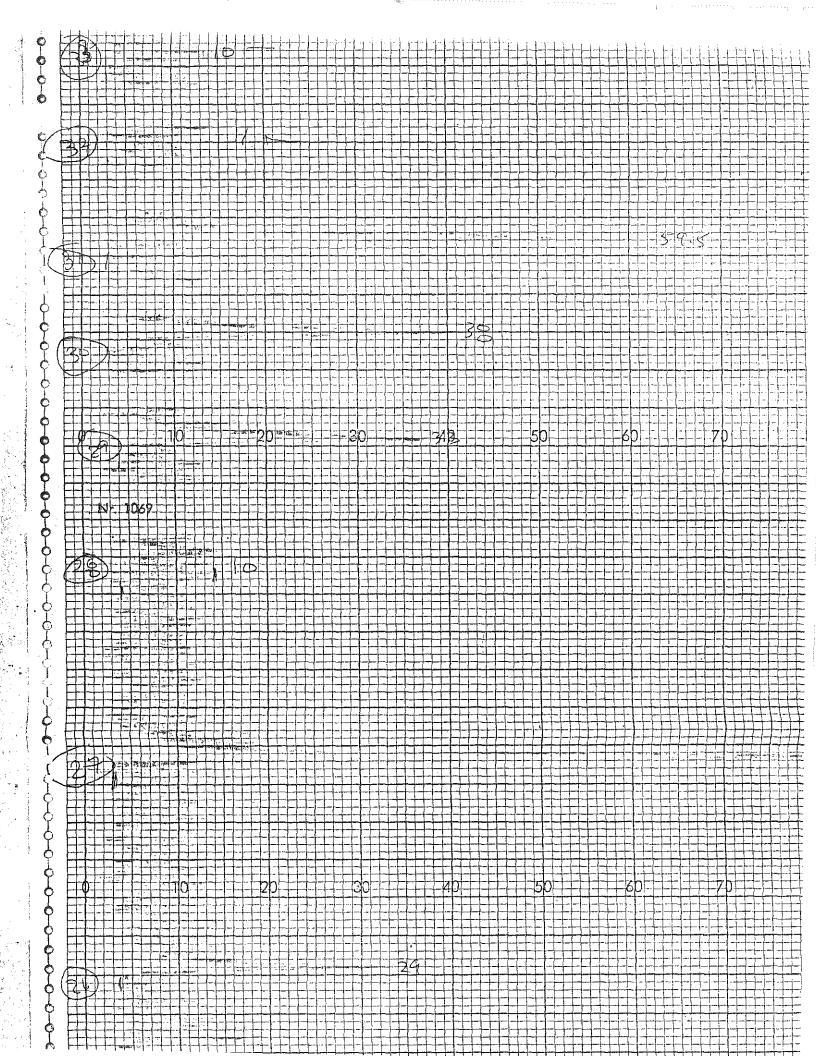
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Enclosures

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### DETERMINATION OF ARSENIC, SELENIUM AND MERCURY IN DRINKING WATER

#### SCOPE

This method describes the determination of As, Se and Hg in drinking water in concentrations above 1  $\mu$ g/l. This method is also suitable for determining Bi and Sb.

#### OPERATING PARAMETERS

Element

Source

Wavelength (nm)

Slit Setting (nm)

Purge Gas

Background Correction

MHS-1 Program

Cell Temp.

Reductant (2.5 ml)

MHS-10 Cell Heating

Reductant

		-	
As	Se	Нд	
FDL.	EDL	EDL	
193.7	196.0	253.6	
0.7	2.0	0.7	
Ar/N <sub>2</sub>	Ar/N₂	Ar/N <sub>2</sub>	
No	No	No	
HYD I	HYD IV	Hg III ;	
900 °C	900 °C	200 °C	
5% NaBH₄ 2% NaOH	5% NaBH₄ 2% NaOH	5% NaBH₄ 2% NaOH	
Air/C <sub>2</sub> H <sub>2</sub>	Air/C <sub>2</sub> H <sub>2</sub>		
3% NaBH₄ 1% NaOH	3% NaBH₄ 1% NaOH	3% NaBH4 1% NaOH	

### INTERFERENCES

No interferences have been reported.

#### REAGENTS

30% hydrochloric acid

5% potassium permanganate solution

1.5%; 30% nitric acid

1.5%; 30% sulphuric acid

All reagents of Analytical Reagent (AR) grade.

### STANDARD SOLUTIONS

0.002	0.004	0.008 µg As/ml		
0.002	0.004	$0.008~\mu g~Se/ml$		
0.001	0.002	0.004 μg Hg/ml	(diluent:	1.5% HNO <sub>3</sub> + 1.5% H <sub>2</sub> SO <sub>4</sub>
			,	solution)

10-ml aliquots used for calibration.

#### SAMPLE PREPARATION

For As and Se determinations, 10-ml sample aliquots are dispensed into the reaction flask and acidified with 500  $\mu l$  30% HCl.

For Hg determinations, 10-ml sample aliquots are dispensed into the reaction flask and acidified with 500  $\mu$ l 30% HNO3 and 500  $\mu$ l 30% H<sub>2</sub>SO<sub>4</sub>. To oxidize any organically-bound Hg, 5% KMnO<sub>4</sub> solution is added dropwise until the violet colour just remains. At least 30 s should elapse before the determination is performed.

#### ANALYSIS

10-ml sample aliquots are normally used for all determinations.

To determine lower concentrations, sample aliquots of up to 50 ml may be used. To prepare calibration plots, the standard solutions should be correspondingly diluted. The acid content must be increased appropriately.

#### CALCULATION

The standard solutions have concentrations corresponding to:

- $2, 4, 8 \mu g As/1$
- 2, 4, 8 μg Se/l
- 1, 2,  $4 \mu g Hg/l$

The concentration of each metal in the sample can be obtained by direct comparison to the standard calibration plot.

The analytical data presented on the following pages has been developed by the Stanley Works Corporate Laboratory. Included in the data is an E.P. Toxicity summary sheet on all the samples analyzed; individual data sheets detailing both Total and Extractable metal values for each sample; and the analytical data derived by the method of standard additions for both Total and Extractable metals.

As stated earlier in the petition, metals which yielded absorbance values corresponding to concentrations below the allowable limits, were not quantified by the method of standard additions. The metals barium and silver consistently yielded low absorbance values and were not quantified. Cadmium and lead also yielded low absorbance values but due to the low E.P. Toxicity limits placed on these metals and since they could be present in electroplating operations at the facility, the leachate samples were quantified by the method of additions.

STANLEY TOOLS - FOWLERVILLE EPA ID #MID099124299

E. P. TOXICITY EXTRACTION RESULTS SUMMARY mg/1

SAMPLE	ARSENIC	BARIUM	CADMIUM	CHROMIUM TOTAL	COPPER	LEAD MERC	URY NICKEL	SELENIUM	SILVER ZINC
own. Dr	ANDENIC	DAKTOM	CADMIOM	IOIAL	COFFER	LEAD MERC	OKI NICKEL	SETENTOM	SIDVER GINC
A	N.A.	5.0*	0.02*	0.05*	0.38	0.05* N.A.	1.60	N.A.	0.02* 0.85
В	N.A.	5.0*	0.02*	0.05	0.70	0.05* N.A.	4.50	N.A.	0.02* 10.5
С	N.A.	5.0*	0.02*	0.05*	0.50	0.05* N.A.	2.70	N.A.	0.02* 7.10
D	N.A.	5.0*	0.02*	0.05*	0.38	0.05* N.A.	1.33	N.A.	0.02* 1.05
E	N.A.	5.0*	0.02*	0.05*	0.23	0.05* N.A.	1.45	N.A.	0.02* 1.71
F.	N.A.	5.0*	0.02*	0.05*	1.05	0.05* N.A.	8.20	N.A.	0.02* 17.6
G	N.A.	5.0*	0.02*	0.05*	0.20	0.05* N.A.	0.63	N.A.	0.02* 3.25
Н	N.A.	5.0*	0.02*	0.05*	0.20	0.05* N.A.	4.87	N.A.	0.02* 14.5
I	N.A.	5.0*	0.02*	0.32	0.32	0.05* N.A.	6.25	N.A.	0.02* 0.70
J	N.A.	5.0*	0.02*	0.05*	0.38	).05* N.A.	9.50	N.A.	0.02* 5.5
К	N.A.	5.0*	0.02*	0.05*	0.40	0.05* N.A.	1.95	N.A.	0.02* 0.94
L	N.A.	5.0*	0.02*	0.05*	0.20	0.05* N.A.	6.20	N.A.	0.02* 2.20
M	N.A.	5.0*	0.02*	0.05*	0.37	0.05* 0.002	27 0.95	N.A.	0.02* 2.65

N.A. - Not analyzed for in the extractable metals sample since they are not used in our process and total constituent analysis of composite indicates a level below the given detection limits.

<sup>\*</sup> Not detected, concentration found to be lower than the detection limit given.

Sample_A	Lagoon # l	
Parameter	Total Metals	Extractable Metals
	% Dry Weight	mg/l
Arsenic	N.A.	N.A.
Barium	N.D < 0.10%	$N.D \langle 5.0$
Cadmium	N.D < 0.0004%	N.D < 0.02
Chromium, Total	2.40%	N.D < 0.05
Copper	3.86%	0.38
Lead	N.D < 0.001%	N.D < 0.05
Mercury	N.A.	N.A.
Nickel	2.74%	1.60
Selenium	N.A.	N.A.
Silver	N.D ∠ 0.0004%	N.D <0.02
Zinc	2.80%	0.85
рн	9.54	
% Solids -	4.25%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample B	Lagoon # 1	
Parameter	Total Metals % Dry Weight	Extractable Metals mg/l
Arsenic	N.A.	N.A.
Barium	N.D < 0.10%	N.D <5.0
Cadmium	N.D < 0.0004%	N.D < 0.02
Chromium, Total	1.70%	0.05
Copper	3.24%	0.70
Lead	N.D < 0.001%	<0.05
Mercury	N.A.	N.A.
Nickel	1.80%	4.50
Selenium	N.A.	N.A.
Silver	N.D < 0.0004%	N.D < 0.02
Zinc	4.00%	10.5
рН	9.12 3.57%	
% Solids -	J. J / 6	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample C	Lagoon #l	
Parameter	Total Metals	Extractable Metals
	% Dry Weight	mg/l
Arsenic	N.A.	N.A.
Barium	N.D <b>⟨</b> 0.10%	N.D 45.0
Cadmium	N.D < 0.0004%	N.D <0.02
Chromium, Total	5.60%	$N.D \angle 0.05$
Copper	2.54%	0.50
Lead	N.D <0.001%	N.D < 0.05
Mercury	N.A.	N.A.
Nickel	1.80%	2.70
Selenium	N.A.	N.A.
Silver	N.D < 0.0004%	N.D < 0.02
Zinc	3.74%	7.10
рн	9.20	
% Solids -	10.28%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample D	Lagoon # 1	
Parameter	Total Metals % Dry Weight	Extractable Metals mg/l
Arsenic Barium Cadmium Chromium, Total Copper Lead Mercury Nickel Selenium Silver	N.A.  N.D < 0.10%  N.D < 0.0004%  5.60%  1.52%  N.D < 0.001%  N.A.  2.30%  N.A.  N.D < 0.0004%  2.80%	N.A.  N.D <5.0  N.D <0.02  N.D <0.05  0.38  N.D <0.05  N.A.  1.33  N.A.  N.D <0.02  1.05
рH	10.50	1,00
% Solids -	2.63%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample E	Lagoon # 2	
Parameter	Total Metals	Extractable Metals
	% Dry Weight	mg/l
Arsenic	N.A.	N.A.
Barium	N.D <0.1%	N.D 45.0
Cadmium	N.D < 0.0004%	N.D <0.02
Chromium, Total	2.70%	N.D 40.05
Copper	4.24%	0.23
Lead	N.D < 0.001%	N.D < 0.05
Mercury	N.A.	N.A.
Nickel	1.10%	1.45
Selenium	N.A.	N.A.
Silver	N.D < 0.0004%	N.D <0.02
Zinc	3.78%	1.71
рн	9.30	
% Solids -	1.74%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

SampleF		Lagoon # 2	•
Parameter		Total Metals % Dry Weight	Extractable Metals mg/l
Arsenic Barium	N D	N.A.	N.A.
Cadmium	N.D. N.D.	<0.1% <0.0004%	N.D. <5.0 N.D. <0.02
Chromium, Total	1,020	1.86%	N.D. <0.05
Copper		5.04%	1.05
Lead	N.D.	<b>&lt;</b> 0.001%	N.D. < 0.05
Mercury		N.A.	N.A.
Nickel		2.08	8.20
Selenium		N.A.	N.A.
Silver	N.D.	<0.0004%	N.D. < 0.02
Zinc		6.14	17.6
рН		8.92	
% Solids -		4.15%	•

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample G	Lagoon # 2	
Parameter	Total Metals % Dry Weight	Extractable <b>M</b> etals mg/l
Arsenic	N.A.	N.A.
Barium	N.D. < 0.10%	N.D. <5.0
Cadmium	N.D. <0.0004%	N.D. < 0.02
Chromium, Total	2.18%	N.D. < 0.05
Copper	3.00%	0.20
Lead	N.D. < 0.001%	N.D. < 0.05
Mercury	N.A.	N.A.
Nickel	1.10%	0.63
Selenium	N.A.	N.A.
Silver	N.D. < 0.0004%	N.D. < 0.02
Zinc	4.00%	3.25
рН	8.53	
% Solids ~	3.02%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample H	Lagoon # 2	
Parameter	Total Metals % Dry Weight	Extractable Metals mg/l
		-
Arsenic	N.A.	N.A.
Barium	N.D. <0.10%	N.D. < 5.0
Cadmium	N.D. < 0.0004%	N.D. <0.02
Chromium, Total	2.44	N.D. <0.05
Copper	3.10	0.20
Lead	N.D. < 0.0013	N.D. <0.05
Mercury	N.A.	N.A.
Nickel	1.36%	4.87
Selenium	N.A.	N.A.
Silver	N.D. < 0.0004%	N.D. <0.02
Zinc	5.16%	14.5
рН	8.85	
% Solids -	2.73%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Analysis Data

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

SampleI	Lagoon # 3	<del></del>
Parameter	Total Metals % Dry Weight	Extractable Metals mg/l
Arsenic	N.A.	N.A.
Barium	N.D. < 0.10%	N.D. <5.0
Cadmium	N.D. <0.0004%	N.D. <0.02
Chromium, Total	1.28%	0.32
Copper	1.64%	0.32
Lead	N.D. <0.001%	N.D. <0.05
Mercury	N.A.	N.A.
Nickel	1.88%	6.25
Selenium	N.A.	N.A.
Silver	N.D. < 0.0004%	N.D. < 0.02
Zinc	1.70%	0.70
pН	9.13	•
% Solids -	1.74%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

dlw

Analysis Data

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

SampleJ		Lagoon # 3			
Parameter		Total Metals	Extractable Metal:	Extractable Metal	S
		% Dry Weight	mg/l	mg/l	
Arsenic		N.A.	N.A.	N.A.	
Barium	N.D.	<0.10%	N.D. < 5.0	.D. < 5.0	
Cadmium	N.D.	< 0.0004%	N.D. < 0.02	.D. < 0.02	
Chromium, Total		1.34%	N.D. < 0.05	.D. < 0.05	
Copper		2.76%	0.38	0.38	
Lead	N.D.	< 0.001%	N.D. <0.05	.D. <0.05	
Mercury		N.A.	N.A.	N.A.	
Nickel	•	2.60%	9.50	9.50	
Selenium		N.A.	N.A.	N.A.	
Silver	N.D.	< 0.0004%	N.D. < 0.02	.D. <0.02	
Zinc		2.68%	5.50	5.50	
рН		9.09			
% Solids -		2.01%			

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

dlw

Sample <u>K</u>	Lagoon # 4	-
Parameter	Total Metals % Dry Weight	Extractable Metals mg/l
Arsenic	N.A.	N.A.
Barium	N.D. < 0.10%	N.D. <b>&lt;</b> 0.50
Cadmium	N.D. <0.00048	N.D. < 0.02
Chromium, Total	0.96%	N.D. <0.05
Copper	0.80%	0.40
Lead	N.D. <0.001%	N.D. <0.05
Mercury	N.A.	N.A.
Nickel	1.40%	1.95
Selenium	N.A.	N.A.
Silver	N.D. < 0.0004%	N.D. <0.02
Zinc	1.32%	0.94
рН	9.53	
% Solids -	1.13%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample L		Lagoon # 4	
Parameter		Total Metals	Extractable Metals
		% Dry Weight	mg/l
Arsenic		N.A.	N.A.
Barium	N.D.	<0.10%	N.D. <5.0
Cadmium	N.D.	<0.0004%	N.D. <0.02
Chromium, Total		1.06%	N.D. < 0.05
Copper		2.00%	0.20
Lead	N.D.	0.001%	N.D. < 0.05
Mercury		N.A.	N.A.
Nickel		1.68%	6.20
Selenium		N.A.	N.A.
Silver	N.D.	< 0.0004%	N.D. <0.02
Zinc		2.00%	2.20
рН		9.03	
% Solids -		1.25%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

Sample M		Lagoon $\#1,2,3,4$	Composite
#1299			
Parameter		Total Metals	Extractable Metals
		% Dry Weight	mg/l
Arsenic *	N.D.	< 0.000272%	N.A.
Barium	N.D.	<0.01%	N.D. <5.0
Cadmium	N.D.	<0.0004%	N.D. <0.02
Chromium, Total		2.14%	N.D. <0.05
Copper		3.36%	0.37
Lead	N.D.	<0.001%	N.D. <0.05
Mercury *	N.D.	<0.000589%	0.0027
Nickel		1.64%	0.95
Selenium *	N.D.	<0.000544%	N.A.
Silver	N.D.	<0.0004%	N.D. <0.02
Zinc		4.00%	2.65
рН		9.02	
% Solids -		3.16%	

- N.A. Not analyzed for in the individual samples since they are not used in our process. See Total Constituent Analysis Sample M.
- N.D. Not detected, concentration found to be lower than the detection limit given.

<sup>\*</sup> Analyzed by TRC Environmental Consultants

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample A	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100  Element Analyzed Copper (Cu)	
Element Analyzed Copper (Cu)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.047 .046
20 mls Blank and 30 mls Sample	.047 .046 nple .060 .060
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l _Cu and 30 mls Sam	.047 .046  nple .060 .060  nple .076 .075
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lcu and 30 mls Sam  20 mls 1.0 mg/lcu and 30 mls Sam	.047 .046  mple .060 .060  mple .076 .075
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l _Cu and 30 mls Sam 20 mls 1.0 mg/l _Cu and 30 mls Sam 20 mls 2.0 mg/l _Cu and 30 mls Sam	.047 .046  nple .060 .060  nple .076 .075  nple .104 .104
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l _Cu and 30 mls Sam  20 mls 1.0 mg/l _Cu and 30 mls Sam  20 mls 2.0 mg/l _Cu and 30 mls Sam  X - Intercept =	.047 .046  nple .060 .060  nple .076 .075  nple .104 .104

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample A	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed <u>Zinc (Zn)</u>	•
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	.173 .171
20 mls 0.5 mg/l $\underline{zn}$ and 30 mls Sam	ple
20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sam	ple286
20 mls 2.0 mg/l $\underline{zn}$ and 30 mls Sam	ple <u>.394</u> .395
X - Intercept = 1.40	
White Adaptive states against the state of t	Factor = Actual Concentration
White Adaptive states against the state of t	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample A	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	nod of Standard Additions
Dilution Factor 100	
Element Analyzed Nickel (Ni)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.020 .020
20 mls Blank and 30 mls Sample	.020 .020 ple .027 .027
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{ m Ni}$ and 30 mls Sam	.020 .020 ple .027 .027 ple .035 .034
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Ni</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Ni</u> and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept = 1.37	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample A	Sample Size <u>1.0000</u> gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed Chromium (Cr)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .032 .032
	.032 .032
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l cr _ and 30 mls Sam	.032 .032 ple .045 .045 ple .059 .059
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sam	.032 .032 ple .045 .045 ple .059 .059
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Cr and 30 mls Sam 20 mls 1.0 mg/l Cr and 30 mls Sam 20 mls 2.0 mg/l Cr and 30 mls Sam X - Intercept = 1.20	.032 .032 ple .045 .045 ple .059 .059
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Cr and 30 mls Sam 20 mls 1.0 mg/l Cr and 30 mls Sam 20 mls 2.0 mg/l Cr and 30 mls Sam X - Intercept = 1.20	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample B	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
rotadimod in dapitodoc,	
Dilution Factor 100	
Element Analyzed Copper (Cu)	
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	.047 .047
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lcu and 30 mls Sam	
	ple .061 .061
20 mls 0.5 mg/l <u>Cu</u> and 30 mls Sam	ple .061 .061 ple .075 .075
20 mls 0.5 mg/l <u>Cu</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Cu</u> and 30 mls Sam 20 mls 2.0 mg/l <u>Cu</u> and 30 mls Sam	ple .061 .061 ple .075 .075
20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam 20 mls 2.0 mg/l and 30 mls Sam X - Intercept = 1.62	ple .061 .061 ple .075 .075 ple .105 .103
20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam 20 mls 2.0 mg/l and 30 mls Sam X - Intercept = 1.62  Sample Concentration x Dilution	ple
20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam 20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 1.62  Sample Concentration x Dilution	ple

neomic apporperon Analysis	Scanley 10015 - rowletville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample B	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.226 .225
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{zn}$ and 30 mls Sam	.226 .225 aple .282 .282 aple .339 .338
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{zn}$ and 30 mls Sam 20 mls 1.0 mg/l $\underline{zn}$ and 30 mls Sam	.226 .225 aple .282 .282 aple .339 .338
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam  20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sam  20 mls 2.0 mg/l $\underline{z_n}$ and 30 mls Sam  X - Intercept = $\underline{z_n}$	.226 .225 aple .282 .282 aple .339 .338
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam  20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sam  20 mls 2.0 mg/l $\underline{z_n}$ and 30 mls Sam  X - Intercept = $\underline{z_n}$	.226 .225  aple .282 .282  aple .339 .338  aple .450 .450  Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample B	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	thod of Standard Additions
Dilution Factor 100	
Element Analyzed <u>Nickel (Ni)</u>	
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	.013 .013
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sam	mple
20 mls 1.0 mg/l $\underline{\hspace{1cm}}$ and 30 mls San	mple <u>.027</u> .027
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls San	mple
X - Intercept =90	
Sample Concentration x Dilution	n Factor = Actual Concentration
	0 90.0 mg/1 Ni

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample B	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	thod of Standard Additions
Dilution Factor 100	
Element Analyzed <u>Chromium (</u> Cr)	<b>)</b>
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.023
20 mls Blank and 30 mls Sample	.023 .023 mple .036 .036
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample	.023 .023 mple .036 .036 mple .049 .049
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample  20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample	.023 .023  mple .036 .036  mple .049 .049
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample  20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample  20 mls 2.0 mg/l <u>Cr</u> and 30 mls Sample  X - Intercept = <u>.850</u>	.023 .023  mple .036 .036  mple .049 .049
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample  20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample  20 mls 2.0 mg/l <u>Cr</u> and 30 mls Sample  X - Intercept = <u>.850</u>	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample C	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Copper (Cu	)
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
20 mls Blank and 30 mls Sample	.031 .031 .044 .044
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sample	.031 .031 nple .044 .044 nple .056 .056
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCu and 30 mls Sample  20 mls 1.0 mg/lCu and 30 mls Sample  20 mls 2.0 mg/lCu and 30 mls Sample  X - Intercept =1.27	.031 .031  nple .044 .044  nple .056 .056  nple .080 .080  n Factor = Actual Concentration
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCu and 30 mls Sample  20 mls 1.0 mg/lCu and 30 mls Sample  20 mls 2.0 mg/lCu and 30 mls Sample  X - Intercept =1.27	.031 .031  mple .044 .044  mple .056 .056  mple .080 .080  The Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample C	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Zinc (Zn)	. • ·
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .195 .194
-	.195 .194
20 mls Blank and 30 mls Sample	.195 .194 ple .245 .245
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lzn and 30 mls Sam	.195 .194  ple .245 .245  ple .298 .298
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Zn</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Zn</u> and 30 mls Sam	.195 .194  ple .245 .245  ple .298 .298
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lZn and 30 mls Sam 20 mls 1.0 mg/lZn and 30 mls Sam 20 mls 2.0 mg/lZn and 30 mls Sam X - Intercept =1.87	.195 .194  ple .245 .245  ple .298 .298
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lZn and 30 mls Sam  20 mls 1.0 mg/lZn and 30 mls Sam  20 mls 2.0 mg/lZn and 30 mls Sam  X - Intercept =1.87  Sample Concentration  x  Dilution	.195 .194  .196 .245 .245  .298 .298  .298 .400

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample C	Sample Size 1.0000 gm
Acid digested and analyzed by the Meth performed in duplicate.	nod of Standard Additions
Dilution Factor 100	
Element Analyzed Nickel (Ni)	<b>*</b> °
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance 
	.017 .017
20 mls Blank and 30 mls Sample	.017 .017 ole .026 .026
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Samp	.017 .017 cle .026 .026 cle .035 .035
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sample 20 mls 1.0 mg/l Ni and 30 mls Sample 20 mls 2.0 mg/l Ni and 30 mls Sample X - Intercept =	.017 .017 cle .026 .026 cle .035 .035
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sample 20 mls 1.0 mg/l Ni and 30 mls Sample 20 mls 2.0 mg/l Ni and 30 mls Sample X - Intercept =	.017 .017  cle .026 .026  cle .035 .035  cle .051 .051  Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Powlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample C	Sample Size 1.0000 gm
Acid digested and analyzed by the Meth performed in duplicate.	nod of Standard Additions
Dilution Factor 100	
Element Analyzed Chromium (Cr)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance 
	.056 .056
20 mls Blank and 30 mls Sample	.056 .056 ple .066 .066
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	.056 .056  ple .066 .066  ple .076 .076
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr and 30 mls Sample 20 mls 1.0 mg/lCr and 30 mls Sample	.056 .056  ple .066 .066  ple .076 .076
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCr and 30 mls Sam  20 mls 1.0 mg/lCr and 30 mls Sam  20 mls 2.0 mg/lCr and 30 mls Sam  X - Intercept =2.80	.056 .056  ple .066 .066  ple .076 .076
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCr and 30 mls Sam  20 mls 1.0 mg/lCr and 30 mls Sam  20 mls 2.0 mg/lCr and 30 mls Sam  X - Intercept =2.80	.056 .056  ple .066 .066  ple .076 .076  ple .096 .097

Atomic Absorption Analysis	Stanley Tools	s - Fowlerville
Total Metals Analysis	E.P.A. I.D.	MID099124299
Sample D	Sample Size	1.0000 gm
Acid digested and analyzed by performed in duplicate.	the Method of Standa	rd Additions
Dilution Factor 100	0	
Element Analyzed Con	pper (Cu)	
Standard Additions		
	•	Absorbance
20 mls Blank and 30 mls Sampl		•
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30	ę <u>.02</u> .	1
·	mls Sample .03	1 .021 4 .034
20 mls 0.5 mg/1Cu and 30	mls Sample .034 mls Sample .04	1 .021 4 .034 7 .047
20 mls 0.5 mg/lCu and 30 20 mls 1.0 mg/lCu and 30	mls Sample .034 mls Sample .04	1 .021 4 .034 7 .047
20 mls 0.5 mg/lCu and 30 20 mls 1.0 mg/lCu and 30 20 mls 2.0 mg/lCu and 30  X - Intercept =76	mls Sample .034 mls Sample .04	1 .021 4 .034 7 .047 4 .076
20 mls 0.5 mg/lCu and 30 20 mls 1.0 mg/lCu and 30 20 mls 2.0 mg/lCu and 30  X - Intercept =76	mls Sample .034 mls Sample .04 mls Sample .074 Dilution Factor = Ac	1 .021 4 .034 7 .047 4 .076

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample D	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Nickel (Ni)	
•	
·	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance 017017
	017017
20 mls Blank and 30 mls Sample	.017 .017 aple .024 .024
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l Ni and 30 mls Sam  20 mls 1.0 mg/l Ni and 30 mls Sam  20 mls 2.0 mg/l Ni and 30 mls Sam  20 mls 2.0 mg/l Ni and 30 mls Sam	.017 .017 aple .024 .024 aple .032 .032 aple .047 .048
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l Ni and 30 mls Sam  20 mls 1.0 mg/l Ni and 30 mls Sam  20 mls 2.0 mg/l Ni and 30 mls Sam  x - Intercept = 1.15	.017 .017 aple .024 .024 aple .032 .032 aple .047 .048

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample D	Sample Size 1.0000 gm
Acid digested and analyzed by the Me performed in duplicate.	thod of Standard Additions
Dilution Factor 100	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .159
	.162 .159
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\frac{Zn}{}$ and 30 mls Sample 20 mls 0.5 mg/l $\frac{Zn}{}$	.162 .159  mple .217 .216  mple .276 .274
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\frac{Zn}{2n}$ and 30 mls Sample 20 mls 1.0 mg/l $\frac{Zn}{2n}$ and 30 mls Sample	.162 .159  mple .217 .216  mple .276 .274
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $\frac{Zn}{}$ and 30 mls Sample  20 mls 1.0 mg/l $\frac{Zn}{}$ and 30 mls Sample  20 mls 2.0 mg/l $\frac{Zn}{}$ and 30 mls Sample  X - Intercept = $\frac{1.40}{}$	.162 .159  mple .217 .216  mple .276 .274
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $\frac{Zn}{}$ and 30 mls Sample  20 mls 1.0 mg/l $\frac{Zn}{}$ and 30 mls Sample  20 mls 2.0 mg/l $\frac{Zn}{}$ and 30 mls Sample  X - Intercept = $\frac{1.40}{}$	.162 .159  mple .217 .216  mple .276 .274  mple .380 .381  n Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools -	Fowlerville	· <del>2</del>
Total Metals Analysis	E.P.A. I.D. #MII	0099124299	
Sample D	Sample Size 1.	0000 gm	
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard 1	Additions	
Dilution Factor 100			
Element Analyzed * Chromium (Cr	)		
Standard Additions	Abse	orbance	
Standard Additions 20 mls Blank and 30 mls Sample	.057		057
	.057		057 064
20 mls Blank and 30 mls Sample	.057 ple .066		· · · · · · · · · · · · · · · · · · ·
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr and 30 mls Sam	.057 ple .066 ple .077		064
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr and 30 mls Sam 20 mls 1.0 mg/lCr and 30 mls Sam	.057 ple .066 ple .077		064
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCr and 30 mls Sam  20 mls 1.0 mg/lCr and 30 mls Sam  20 mls 2.0 mg/lCr and 30 mls Sam  X - Intercept =2.80	.057 ple .066 ple .077 ple .098		064 076 097
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCr and 30 mls Sam  20 mls 1.0 mg/lCr and 30 mls Sam  20 mls 2.0 mg/lCr and 30 mls Sam  X - Intercept =2.80	.057  ple .066  ple .077  ple .098  Factor = Actua		064 076 097

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample E	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Copper (Cu)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	059058
20 mls Blank and 30 mls Sample	.059 .058 ple .073 .072
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l _Cu and 30 mls Sam	.059 .058  ple .073 .072  ple .087 .086
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l _Cu _ and 30 mls Sam 20 mls 1.0 mg/l _Cu _ and 30 mls Sam	.059 .058  ple .073 .072  ple .087 .086
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/1 _Cu _ and 30 mls Sam 20 mls 1.0 mg/1 _Cu _ and 30 mls Sam 20 mls 2.0 mg/1 _Cu _ and 30 mls Sam X - Intercept =2.12	.059 .058  ple .073 .072  ple .087 .086
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/1 _Cu _ and 30 mls Sam 20 mls 1.0 mg/1 _Cu _ and 30 mls Sam 20 mls 2.0 mg/1 _Cu _ and 30 mls Sam X - Intercept =2.12	.059 .058  ple .073 .072  ple .087 .086  ple .115 .114  Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample E	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Nickel (Ni)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .010
	.011 .010
20 mls Blank and 30 mls Sample	.011 .010 ple .020 .021
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sam	.011 .010  ple .020 .021  ple .029 .032
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $\frac{\text{Ni}}{\text{Ni}}$ and 30 mls Sam   20 mls 1.0 mg/l $\frac{\text{Ni}}{\text{Ni}}$ and 30 mls Sam	.011 .010  ple .020 .021  ple .029 .032
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept =	.011 .010  ple .020 .021  ple .029 .032
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept =	.011 .010  ple .020 .021  ple .029 .032  ple .047 .054  Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample E	Sample Size 1.0000 gm
Acid digested and analyzed by the Merperformed in duplicate.	hod of Standard Additions
Dilution Factor 100  Zinc (Zn)	
Standard Additions	
	Absorbance
20 mls Blank and 30 mls Sample	.238 .239
	238
20 mls Blank and 30 mls Sample	.238 .239 nple .303 .298
20 mls Blank and 30 mls Sample $\frac{2n}{2}$ and 30 mls Sample $\frac{2n}{2}$	.238 .239  nple .303 .298  nple .364 .363
20 mls Blank and 30 mls Sample.  20 mls 0.5 mg/l $\frac{2n}{2n}$ and 30 mls Sample.  20 mls 1.0 mg/l $\frac{2n}{2n}$ and 30 mls Sample.	.238 .239  nple .303 .298  nple .364 .363
20 mls Blank and 30 mls Sample.  20 mls 0.5 mg/lZn and 30 mls Sample.  20 mls 1.0 mg/lZn and 30 mls Sample.  20 mls 2.0 mg/lZn and 30 mls Sample.  X - Intercept =1.89	.238 .239  nple .303 .298  nple .364 .363
20 mls Blank and 30 mls Sample.  20 mls 0.5 mg/lZn and 30 mls Sample.  20 mls 1.0 mg/lZn and 30 mls Sample.  20 mls 2.0 mg/lZn and 30 mls Sample.  X - Intercept =1.89	.238 .239  nple .303 .298  nple .364 .363  nple .469 .463

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample E	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Chromium (Cr	)
Standard Additions	Absorbance
Standard Additions  20 mls Blank and 30 mls Sample	Absorbance .034 .034
	.034 .034
20 mls Blank and 30 mls Sample	.034 .034 mple .046 .046
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sam	.034 .034  mple .046 .046  mple .061 .060
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sam	.034 .034  mple .046 .046  mple .061 .060
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCr and 30 mls Sam  20 mls 1.0 mg/lCr and 30 mls Sam  20 mls 2.0 mg/lCr and 30 mls Sam  X - Intercept = 1.35	.034 .034  mple .046 .046  mple .061 .060
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCr and 30 mls Sam  20 mls 1.0 mg/lCr and 30 mls Sam  20 mls 2.0 mg/lCr and 30 mls Sam  X - Intercept = 1.35	.034 .034  nple .046 .046  nple .061 .060  nple .085 .084

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample F	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Copper (Cu)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.074 .074
20 mls Blank and 30 mls Sample	.074 .074 .088 .088
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam	.074 .074  aple .088 .088  aple .102 .102
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam 20 mls 1.0 mg/lCu and 30 mls Sam	.074 .074  aple .088 .088  aple .102 .102
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam 20 mls 1.0 mg/lCu and 30 mls Sam 20 mls 2.0 mg/lCu and 30 mls Sam	.074 .074  .088 .088  .091e .102 .102  .102 .130 .130
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lCu and 30 mls Sam  20 mls 1.0 mg/lCu and 30 mls Sam  20 mls 2.0 mg/lCu and 30 mls Sam  X - Intercept =2.52	.074 .074  .088 .088  .091e .102 .102  .102 .130 .130

Atomic Absorption Analysis	S Stanle	y Tools - Fowlervil	le
Total Metals Analysis	E.P.A.	I.D. #MID099124299	
Sample F	Sample	s Size gm	
Acid digested and analyzed performed in duplicate.	d by the Method of	Standard Additions	
Dilution Factor	100		
Element Analyzed	Zinc (Zn)		
Standard Additions		Absorbance	
Standard Additions 20 mls Blank and 30 mls Sa	ample	Absorbance	.345
	-		.345
20 mls Blank and 30 mls Sa	d 30 mls Sample	.345	
20 mls Blank and 30 mls Sa 20 mls 0.5 mg/l and	d 30 mls Sample	.400	. 400
20 mls Blank and 30 mls Sa 20 mls 0.5 mg/l Zn and 20 mls 1.0 mg/l Zn and	d 30 mls Sample d 30 mls Sample d 30 mls Sample	.345 .400 .456	.400
20 mls Blank and 30 mls Sa 20 mls 0.5 mg/l Zn and 20 mls 1.0 mg/l Zn and 20 mls 2.0 mg/l Zn and	d 30 mls Sample d 30 mls Sample d 30 mls Sample	.345 .400 .456 .556	.400 .458 .556
20 mls Blank and 30 mls Sa 20 mls 0.5 mg/l Zn and 20 mls 1.0 mg/l Zn and 20 mls 2.0 mg/l Zn and X - Intercept = 3	d 30 mls Sample d 30 mls Sample d 30 mls Sample	.345 .400 .456 .556	.400 .458 .556

Atomic Absorption Analysis	Stanley Tools - Fowlerville	
Total Metals Analysis	E.P.A. I.D. #MID099124299	
Sample F	Sample Size 1.0000 gm	
Acid digested and analyzed by the Meth performed in duplicate.	hod of Standard Additions	
Dilution Factor 100		
Element Analyzed Nickel (Ni)	, <b>•</b>	
	•	
Standard Additions	Absorbance	
20 mls Blank and 30 mls Sample	.013 .013	
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Samp		
	ple .019 .019	
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Samp	ple .019 .019 ple .025 .025	
20 mls 0.5 mg/l $\underline{Ni}$ and 30 mls Samp 20 mls 1.0 mg/l $\underline{Ni}$ and 30 mls Samp	ple .019 .019 ple .025 .025	
20 mls 0.5 mg/l $\underline{Ni}$ and 30 mls Samp 20 mls 1.0 mg/l $\underline{Ni}$ and 30 mls Samp 20 mls 2.0 mg/l $\underline{Ni}$ and 30 mls Samp X - Intercept = $\underline{1.04}$	ple .019 .019 ple .025 .025	
20 mls 0.5 mg/l $\underline{Ni}$ and 30 mls Samp 20 mls 1.0 mg/l $\underline{Ni}$ and 30 mls Samp 20 mls 2.0 mg/l $\underline{Ni}$ and 30 mls Samp X - Intercept = $\underline{1.04}$	ple .019 .019 ple .025 .025 ple .037 .037	

Atomic Absorp	tion Analysis	Stanley Tool	s - Fowlerville
Total Metals	Analysis	E.P.A. I.D.	#MID099124299
Sample I		Sample Size	1.0000 gm
Acid digested performed in	and analyzed by duplicate.	the Method of Standa	rd Additions
Dilution Fact	or 100	)	
Element Analy	zed Chron	nium (Cr)	
: -	1	·	
• •		·	
Standard	Additions		Absorbance
	Additions and 30 mls Sampl	e <u>.024</u>	Absorbance .024
	and 30 mls Sampl	e <u>.024</u> mls Sample <u>.037</u>	
20 mls Blank	and 30 mls Sampl	With the state of	.024
20 mls Blank 20 mls 0.5 mg	and 30 mls Sampl /1Cr and 30 /1Cr and 30	mls Sample .037	.024
20 mls Blank 20 mls 0.5 mg 20 mls 1.0 mg	and 30 mls Sampl /1Cr and 30 /1Cr and 30 /1Cr and 30	mls Sample .037 mls Sample .051	.024 .037 .051
20 mls Blank 20 mls 0.5 mg 20 mls 1.0 mg 20 mls 2.0 mg	and 30 mls Sampl /1Cr and 30 /1Cr and 30 /1Cr and 30 rcept =93	mls Sample .037 mls Sample .051 mls Sample .075	.024 .037 .051
20 mls Blank 20 mls 0.5 mg 20 mls 1.0 mg 20 mls 2.0 mg X - Inte	and 30 mls Sampl /1Cr and 30 /1Cr and 30 /1Cr and 30 rcept =93	mls Sample .037 mls Sample .051 mls Sample .075	.024 .037 .051 .075

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample G -	Sample Size 1.0000 gm
Acid digested and analyzed by the Meth performed in duplicate.	nod of Standard Additions
Dilution Factor 100	
Element Analyzed Copper (Cu)	
	•
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.039 .039
20 mls Blank and 30 mls Sample	.039 .039 ple053 .052
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.039 .039 ple053 .052 ple065 .065
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sample 20 mls 1.0 mg/l and 30 mls Sample 20 mls 2.0 mg/l and 30 mls Sample X - Intercept = 1.50	.039 .039 ple .053 .052 ple .065 .065
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sample 20 mls 1.0 mg/l and 30 mls Sample 20 mls 2.0 mg/l and 30 mls Sample X - Intercept = 1.50	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>G</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.241 .238
20 mls Blank and 30 mls Sample	241
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{Zn}$ and 30 mls Sam	.241 .238  ple .298 .299  ple .355 .352
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam   20 mls 1.0 mg/l $_{\rm Zn}$ and 30 mls Sam	.241 .238  ple .298 .299  ple .355 .352
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $Z_n$ and 30 mls Sam  20 mls 1.0 mg/l $Z_n$ and 30 mls Sam  20 mls 2.0 mg/l $Z_n$ and 30 mls Sam  X - Intercept = $2.00$	.241 .238  ple .298 .299  ple .355 .352
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $Z_n$ and 30 mls Sam  20 mls 1.0 mg/l $Z_n$ and 30 mls Sam  20 mls 2.0 mg/l $Z_n$ and 30 mls Sam  X - Intercept = $2.00$	.241 .238  ple .298 .299  ple .355 .352  ple .452 .451  Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>G</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed Nickel (Ni)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.010 .010
20 mls Blank and 30 mls Sample	.010 .010 ple .019 .019
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{ m Ni}$ and 30 mls Sam	.010 .010  ple .019 .019  ple .028 .029
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $_{ m Ni}$ and 30 mls Sam   20 mls 1.0 mg/l $_{ m Ni}$ and 30 mls Sam	.010 .010  ple .019 .019  ple .028 .029
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept =55	.010 .010  ple .019 .019  ple .028 .029
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept =55	.010 .010  ple .019 .019  ple .028 .029  ple .046 .047

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>G</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100  Element Analyzed Chromium Total	al
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.024 .024
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 1.09	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 1.09	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>H</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed <u>Copper (Cu)</u>	•
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	046046
20 mls Blank and 30 mls Sample	.046 .046 ple .060 .060
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam 20 mls 1.0 mg/lCu and 30 mls Sam 20 mls 2.0 mg/lCu and 30 mls Sam X - Intercept =1.55	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 1.55  Sample Concentration x Dilution	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 1.55  Sample Concentration x Dilution  mg/l 100	

dlw

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample H	Sample Size 1,0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	279279
20 mls 0.5 mg/l $\underline{zn}$ and 30 mls Sam	ple333333
20 mls 1.0 mg/l $\underline{zn}$ and 30 mls Sam	ple
20 mls 2.0 mg/l $\underline{zn}$ and 30 mls Sam	ple485485
X - Intercept = 2.58	
Sample Concentration x Dilution	Factor = Actual Concentration
100	258.0 mg/l Zn

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample H	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed <u>Nickel (Ni)</u>	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	011011
20 mls Blank and 30 mls Sample	.011 .011 ple .019 .019
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam	.011 .011 ple .019 .019 ple .027 .027
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Ni</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Ni</u> and 30 mls Sam	.011 .011 ple .019 .019 ple .027 .027
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept =	.011 .011 ple .019 .019 ple .027 .027
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept =	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>H</u>	Sample Size 1,0000 gm
Acid digested and analyzed by the Meth performed in duplicate.	nod of Standard Additions
Dilution Factor	
Element Analyzed Chromium (Cr)	
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	.024 .026
20 mls 0.5 mg/l and 30 mls Samp	ole <u>.035</u> 035
20 mls 1.0 mg/l $\underline{\text{Cr}}$ and 30 mls Samp	ole045
20 mls 2.0 mg/l $\underline{\text{Cr}}$ and 30 mls Samp	
	ole <u>.068</u> .068
X - Intercept = 1.22	oie <u>.068</u> .068
	Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample I	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Copper (Cu)	
	- -
•	
•	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.029 .029
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lcu and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam 20 mls 1.0 mg/lCu and 30 mls Sam 20 mls 2.0 mg/lCu and 30 mls Sam X - Intercept =820	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam 20 mls 1.0 mg/lCu and 30 mls Sam 20 mls 2.0 mg/lCu and 30 mls Sam X - Intercept =820	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>I</u>	Sample Size <u>1.0000</u> gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance115116
	.115 .116
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam	
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam   20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sam	
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam   20 mls 1.0 mg/l $_{\rm Zn}$ and 30 mls Sam   20 mls 2.0 mg/l $_{\rm Zn}$ and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam 20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sam 20 mls 2.0 mg/l $\underline{z_n}$ and 30 mls Sam $X - Intercept = \underline{85}$	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample I	Sample Size 1.0000 gm
Acid digested and analyzed by the Metiperformed in duplicate.	hod of Standard Additions
Dilution Factor	
Element Analyzed Nickel (Ni)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .017
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept = 940	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept = 940	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>I</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Metiperformed in duplicate.	hod of Standard Additions
Dilution Factor 100  Element Analyzed Chromium (Cr)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance 018018
	.018 .018
20 mls Blank and 30 mls Sample	.018 .018 ple .033 .033
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr and 30 mls Sam	.018 .018 ple .033 .033 ple .047 .046
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr and 30 mls Sam 20 mls 1.0 mg/lCr and 30 mls Sam	.018 .018 ple .033 .033 ple .047 .046
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr _ and 30 mls Sam 20 mls 1.0 mg/lCr _ and 30 mls Sam 20 mls 2.0 mg/lCr _ and 30 mls Sam X - Intercept =640	.018 .018 ple .033 .033 ple .047 .046
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCr _ and 30 mls Sam 20 mls 1.0 mg/lCr _ and 30 mls Sam 20 mls 2.0 mg/lCr _ and 30 mls Sam X - Intercept =640	

Stanley Tools - Fowlerville	
E.P.A. I.D. #MID099124299	
Sample Size <u>1.0000</u> gm	
od of Standard Additions	
Absorbance	
049050	
ole	
ole	
4	
ole	
ole	
ole	
	E.P.A. I.D. #MID099124299  Sample Size 1.0000 gm  od of Standard Additions  Absorbance

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample	Sample Size 1.0000 gm
Acid digested and analyzed by the Meth performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
20 mls Blank and 30 mls Sample	.170 .170 ple
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{Zn}$ and 30 mls Sample	
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sample   20 mls 1.0 mg/l $_{\rm Zn}$ and 30 mls Sample	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $_{Zn}$ and 30 mls Sample  20 mls 1.0 mg/l $_{Zn}$ and 30 mls Sample  20 mls 2.0 mg/l $_{Zn}$ and 30 mls Sample  X - Intercept = $_{1.34}$	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $_{Zn}$ and 30 mls Sample  20 mls 1.0 mg/l $_{Zn}$ and 30 mls Sample  20 mls 2.0 mg/l $_{Zn}$ and 30 mls Sample  X - Intercept = $_{1.34}$	

Atomic Absorption Analysis	Stanley Tools - Fowlerville	
Total Metals Analysis	E.P.A. I.D. #MID099124299	
Sample J	Sample Size 1.0000 gm	
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions	
Dilution Factor 100		٠
Element Analyzed <u>Nickel (Ni)</u>		
Standard Additions	Absorbance	
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance	
	.026 .026	
20 mls Blank and 30 mls Sample	.026 .026 ple .036 .035	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam	.026 .026 ple .036 .035 ple .046 .044	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Ni</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Ni</u> and 30 mls Sam	.026 .026 ple .036 .035 ple .046 .044	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam 20 mls 1.0 mg/l Ni and 30 mls Sam 20 mls 2.0 mg/l Ni and 30 mls Sam X - Intercept = 1.30	.026 .026 ple .036 .035 ple .046 .044	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l ni and 30 mls Sam  X - Intercept = 1.30  Sample Concentration x Dilution	.026 .026  ple .036 .035  ple .046 .044  ple .075 .076	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>J</u>	Sample Size <u>1.0000</u> gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed <u>Chromium (Cr)</u>	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .015 .015
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam 20 mls 2.0 mg/l and 30 mls Sam X - Intercept =670	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam 20 mls 2.0 mg/l and 30 mls Sam X - Intercept =670	

Atomic Absorption Analysis	Stanley Tools - Fowlerville	
Total Metals Analysis	E.P.A. I.D. #MID099124299	
Sample K	Sample Size 1.0000 gm	
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions	
Dilution Factor100		
Element Analyzed <u>Copper (Cu)</u>		
Standard Additions	Absorbance	
Standard Additions 20 mls Blank and 30 mls Sample		010
		010 026
20 mls Blank and 30 mls Sample		
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	.011	026
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam	.011	026 040
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 400	.011	026 040 070
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 400		026 040 070 ion
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam  X - Intercept = 400  Sample Concentration x Dilution		026 040 070

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample K	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.160 .160
20 mls Blank and 30 mls Sample	.160 .160 ple285 .285
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam	.160 .160  sple .285 .285  sple .410 .411
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam 20 mls 1.0 mg/l $_{\rm Zn}$ and 30 mls Sam	.160 .160  sple .285 .285  sple .410 .411
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{Zn}$ and 30 mls Sam 20 mls 1.0 mg/l $_{Zn}$ and 30 mls Sam 20 mls 2.0 mg/l $_{Zn}$ and 30 mls Sam $X - Intercept =$	.160 .160  sple .285 .285  sple .410 .411
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{Zn}$ and 30 mls Sam 20 mls 1.0 mg/l $_{Zn}$ and 30 mls Sam 20 mls 2.0 mg/l $_{Zn}$ and 30 mls Sam $X - Intercept =$	

Atomic Absorption Analysis	Stanley Tools - Fowlerville	
Total Metals Analysis	E.P.A. I.D. #MID099124299	
Sample K	Sample Size <u>1.0000</u> gm	
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions	
Dilution Factor 100		
Element Analyzed <u>Nickel (Ni)</u>		
Standard Additions	Absorbance	
20 mls Blank and 30 mls Sample		13
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sam	ple	21
20 mls 1.0 mg/1 $\underline{\text{Ni}}$ and 30 mls Sam	ple	32
20 mls 2.0 mg/l $\underline{Ni}$ and 30 mls Sam	ple049 .0	149
	ple	7 2 .
X - Intercept =	.049	
	Factor = Actual Concentration	
	Factor = Actual Concentration	on

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample K	Sample Size <u>1.0000</u> gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor100	
Element Analyzed <u>Chromium (Cr)</u>	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
20 mls Blank and 30 mls Sample	.011 .011 ple .019 .019
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	.011 .011 ple .019 .019 ple .028 .029
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l cr and 30 mls Sam 20 mls 2.0 mg/l cr and 30 mls Sam X - Intercept = 480	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam 20 mls 1.0 mg/l cr and 30 mls Sam 20 mls 2.0 mg/l cr and 30 mls Sam X - Intercept = 480	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>L</u>	Sample Size <u>1.0000</u> gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor100	
Element Analyzed <u>Copper (Cu)</u>	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .030
	.031 .030
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam	.031 .030 ple .046 .046 ple .061 .061
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l cu and 30 mls Sam 20 mls 1.0 mg/l cu and 30 mls Sam	.031 .030 ple .046 .046 ple .061 .061
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCuand 30 mls Sam 20 mls 1.0 mg/lCuand 30 mls Sam 20 mls 2.0 mg/lCuand 30 mls Sam X - Intercept =1.00	.031 .030 ple .046 .046 ple .061 .061
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCuand 30 mls Sam 20 mls 1.0 mg/lCuand 30 mls Sam 20 mls 2.0 mg/lCuand 30 mls Sam X - Intercept =1.00	.031 .030  ple .046 .046  ple .061 .061  ple .091 .091  Factor = Actual Concentration

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>L</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	nod of Standard Additions
Dilution Factor	
Dilution Factor 100	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance .130 .130
	130130
20 mls Blank and 30 mls Sample	.130 .130 ple .198 .197
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam	.130 .130 ple .198 .197 ple .264 .260
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam   20 mls 1.0 mg/l $_{\rm Zn}$ and 30 mls Sam	
20 mls Blank and 30 mls Sample   20 mls 0.5 mg/l $_{\rm Zn}$ and 30 mls Sam   20 mls 1.0 mg/l $_{\rm Zn}$ and 30 mls Sam   20 mls 2.0 mg/l $_{\rm Zn}$ and 30 mls Sam	.130 .130  ple .198 .197  ple .264 .260  ple .370 .368
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l $_{Zn}$ and 30 mls Sam  20 mls 1.0 mg/l $_{Zn}$ and 30 mls Sam  20 mls 2.0 mg/l $_{Zn}$ and 30 mls Sam  X - Intercept = $_{1.00}$ Sample Concentration x Dilution	.130 .130  ple .198 .197  ple .264 .260  ple .370 .368

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample L	Sample Size <u>1.0000</u> gm
Acid digested and analyzed by the Metperformed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Nickel (Ni)	<del>v</del>
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance 
20 mls Blank and 30 mls Sample	.017 .018 ple .027 .027
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l Ni and 30 mls Sam	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lNi and 30 mls Sam  20 mls 1.0 mg/lNi and 30 mls Sam  20 mls 2.0 mg/lNi and 30 mls Sam  X - Intercept =840  Sample Concentration x Dilution	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/lNi and 30 mls Sam  20 mls 1.0 mg/lNi and 30 mls Sam  20 mls 2.0 mg/lNi and 30 mls Sam  X - Intercept =840  Sample Concentration x Dilution	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample L	Sample Sizegm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
· ·	
Dilution Factor 100	
Element Analyzed <u>Chromium (Cr)</u>	•
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	.016 .018
	.016 .018
20 mls Blank and 30 mls Sample	.016 .018 ple .034 .034
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sam	.016 .018  ple .034 .034  ple .050 .050
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l cr _ and 30 mls Sam  20 mls 1.0 mg/l cr _ and 30 mls Sam  20 mls 2.0 mg/l cr _ and 30 mls Sam  X - Intercept = 530	.016 .018  ple .034 .034  ple .050 .050
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l cr _ and 30 mls Sam  20 mls 1.0 mg/l cr _ and 30 mls Sam  20 mls 2.0 mg/l cr _ and 30 mls Sam  X - Intercept = 530	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>M</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed <u>Copper (Cu)</u>	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance 
	043043
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lcu and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l <u>Cu</u> and 30 mls Sam 20 mls 1.0 mg/l <u>Cu</u> and 30 mls Sam	
20 mls Blank and 30 mls Sample  20 mls 0.5 mg/l and 30 mls Sam  20 mls 1.0 mg/l and 30 mls Sam  20 mls 2.0 mg/l and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/lCu and 30 mls Sam 20 mls 1.0 mg/lCu and 30 mls Sam 20 mls 2.0 mg/lCu and 30 mls Sam X - Intercept =1.68	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample <u>M</u>	Sample Size 1.0000 gm
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Zinc (Zn)	
Standard Additions	Absorbance
Standard Additions 20 mls Blank and 30 mls Sample	Absorbance
	.195 .195
20 mls Blank and 30 mls Sample	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sam 20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sam	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{ZD}$ and 30 mls Sam 20 mls 1.0 mg/l $_{ZD}$ and 30 mls Sam 20 mls 2.0 mg/l $_{ZD}$ and 30 mls Sam $X - Intercept = _{2.00}$	
20 mls Blank and 30 mls Sample 20 mls 0.5 mg/l $_{ZD}$ and 30 mls Sam 20 mls 1.0 mg/l $_{ZD}$ and 30 mls Sam 20 mls 2.0 mg/l $_{ZD}$ and 30 mls Sam $X - Intercept = _{2.00}$	

Atomic Absorption Analysis	Stanley Tools - Fowlerville
Total Metals Analysis	E.P.A. I.D. #MID099124299
Sample M	Sample Size 1.0000 gm
Acid digested and analyzed by the Meth performed in duplicate.	hod of Standard Additions
Dilution Factor 100	
Element Analyzed Nickel (Ni)	
Standard Additions	Absorbance
20 mls Blank and 30 mls Sample	.015 .016
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sam	ple <u>.025</u> 025
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sam	ple <u>.033</u> <u>.034</u>
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sam	ple .049 .053
<pre>X - Intercept =82  Sample Concentration x Dilution0.82 mg/l100</pre>	Factor = Actual Concentration  82.0 mg/l Ni
% By Weight (dry weight basis) -	1.64

Atomic Absorption Analysis	Stanley Tools - Fowlerville	
Total Metals Analysis	E.P.A. I.D. #MID099124299	
Sample M	Sample Size 1.0000 gm	
Acid digested and analyzed by the Met performed in duplicate.	hod of Standard Additions	
Dilution Factor 100		
Element Analyzed Chromium (Cr)		
Standard Additions	Absorbance	
20 mls Blank and 30 mls Sample	.033 .033	
20 mls 0.5 mg/l $\underline{\text{Cr}}$ and 30 mls Sam	ple .050 .050	
20 mls 1.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sam	ple	
20 mls 1.0 mg/l $\underline{cr}$ and 30 mls Sam 20 mls 2.0 mg/l $\underline{cr}$ and 30 mls Sam		
20 mls 2.0 mg/l and 30 mls Sam  X - Intercept =	nple	

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample A

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Copper (Cu)

Standard Additions	Abs	orbance	
20 mls Blank and 30 mls Sample	.008	.008	.008
20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.019	.019	.019
20 mls 1.0 mg/l _Cu and 30 mls Sample	.029	.029	.029
20 mls 2.0 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.050	.050	.050
X - Intercept =38			
Sample Concentration x Dilution Factor	= Actual	Concentr	ation
0.38 mg/l -	0.38	mg/l	Cu

Stanley Tools - Fowlerville
E.P.A. I.D. #MID099124299

Sample A

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Nickel (Ni)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.019	.019	.019
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.025	.025	.025
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.031	.031	.031
20 mls 2.0 mg/l $\underline{Ni}$ and 30 mls Sample	.043	.043	.043

X - Intercept = 1.60

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample A

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Zinc (Zn)

Standard Additions	A	osorbance	
20 mls Blank and 30 mls Sample	077	.078	.079
20 mls 0.5 mg/l $\underline{zn}$ and 30 mls Sample	.120	.120	.120
20 mls 1.0 mg/l $\frac{\mathrm{Zn}}{}$ and 30 mls Sample	.166	.166	.166
20 mls 2.0 mg/l $\underline{Zn}$ and 30 mls Sample	. 250	.250	.250
x - Intercept = .85		0	

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

None Dilution Factor Lead (Pb) Element Analyzed

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Pb and 30 mls Sample	.005	.005	.005
20 mls 1.0 mg/l Pb and 30 mls Sample	.010	.010	.010
20 mls 2.0 mg/l Pb and 30 mls Sample	.020	.020	.020
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
N.D. mg/1 -	<0.0	5 mg/l <u>F</u>	b b

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

Marin.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample A

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Chromium, Total (Cr)

Standard Additions	A	bsorbance	4.
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.006	.006	.006
20 mls 1.0 mg/l Cr and 30 mls Sample	.011	.011	.011
20 mls 2.0 mg/l Cr and 30 mls Sample	.021	.021	.021

X - Intercept = .000

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/l -  $\angle 0.05$  mg/l Cr

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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E.P.A. I.D. #MID099124299

Sample A

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Cadmium (Cd)

Standard Additions Absorbance .000 20 mls Blank and 30 mls Sample .000 .000 .033 .033 .033 20 mls 0.5 mg/l Cd and 30 mls Sample 20 mls 1.0 mg/l Cd and 30 mls Sample .060 .060 .060 .120 .120 .120 20 mls 2.0 mg/l Cd and 30 mls Sample

X - Intercept = .000

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/l  $\underline{\phantom{a}}$   $\underline$ 

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample B

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Copper (Cu)

Standard Additions	Al	osorbance	
20 mls Blank and 30 mls Sample	.015	.015	.015
20 mls 0.5 mg/l Cu and 30 mls Sample	.025	.025	.025
20 mls 1.0 mg/l Cu and 30 mls Sample	.037	.037	.037
20 mls 2.0 mg/l Cu and 30 mls Sample	.058	.058	.058
X - Intercept = .70	·		
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
0.70 mg/l -	0.7	0 mg/l	Cu

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E.P.A. I.D. #MID099124299

Sample B

4.50 mg/1

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Nickel (Ni)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.057	.057	.057
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.063	.063	.063
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.069	.069	.069
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.082	.082	.082
X - Intercept = 4.5			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation

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4.50 mg/l

Νi

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Sample B

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor 10 Zinc (Zn)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.080	.082	.085
20 mls 0.5 mg/l $\underline{Zn}$ and 30 mls Sample	.121	.121	.125
20 mls 1.0 mg/l $\frac{Zn}{}$ and 30 mls Sample	.160	.160	.163
20 mls 2.0 mg/l $\underline{zn}$ and 30 mls Sample	.230	.233	.236
X - Intercept = .105			
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation

10

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10.5 mg/l

Zn

0.105

mg/l

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Sample B

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Chromium, Total (Cr)

Absorbance Standard Additions .000 .000 .000 20 mls Blank and 30 mls Sample 20 mls 0.5 mg/1 Cr and 30 mls Sample .006 .005 .005 20 mls 1.0 mg/1 Cr and 30 mls Sample .011 .010 .011\_ .021 .020 .021 20 mls 2.0 mg/l Cr and 30 mls Sample

X - Intercept = \_.000

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample B\_\_\_\_

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Lead (Pb)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Pb and 30 mls Sample	.004	.005	.004
20 mls 1.0 mg/l Pb and 30 mls Sample	.010	.009	.009
20 mls 2.0 mg/l Pb and 30 mls Sample	.018	.019	.019

X - Intercept = .000

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/l  $\underline{\hspace{0.5cm}}$  Mg/l  $\underline{\hspace{0.5cm}}$  Pb

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

mg/l

Cadmium (Cd)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cd and 30 mls Sample	.031	.032	.030
20 mls 1.0 mg/l Cd and 30 mls Sample	.063	.062	.063
20 mls 2.0 mg/l Cd and 30 mls Sample	.121	.120	.121
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actual	Concentra	ation
N.D. mg/l -	∠0.02	mg/l Cd	1

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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C Sample

0.50

mq/l

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

None Dilution Factor Copper (Cu) Element Analyzed

## Standard Additions Absorbance 20 mls Blank and 30 mls Sample .011 .011 .011 .022 .022 20 mls 0.5 mg/l Cu and 30 mls Sample .022 .033 .033 .033 20 mls 1.0 mg/1 Cu and 30 mls Sample .053 .054 20 mls 2.0 mg/l Cu and 30 mls Sample .054 X - Intercept = .50Sample Concentration x Dilution Factor = Actual Concentration 0.50 mg/l Cu

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Sample C

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Nickel (Ni)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.038	.038	.038
20 mls 0.5 mg/l $\underline{\rm Ni}$ and 30 mls Sample	.045	.046	.045
20 mls 1.0 mg/l $\underline{\rm Ni}$ and 30 mls Sample	.052	.052	.052
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.065	065	.065
X - Intercept = 2.70		·	
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
	2.7	o_ mg/l _	<u>Ni</u>

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Sample C

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Zinc (Zn)

Standard Additions Absorbance .427 \_\_\_.423 .424 20 mls Blank and 30 mls Sample .455 .452 .452 20 mls 0.5 mg/l Zn and 30 mls Sample 20 mls 1.0 mg/l Zn and 30 mls Sample .485 .485 . 485 .547 .546 20 mls 2.0 mg/l Zn and 30 mls Sample .545

X - Intercept = 7.10

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Sample C

N.D.

mg/l

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Chromium, Total (Cr)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cr and 30 mls Sample	.007	.007	.007
20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample	.014	.014	.014
20 mls 2.0 mg/l Cr and 30 mls Sample	.028	.028	.028
X - Intercept =000			
Sample Concentration x Dilution Factor	= Actual	l Concentra	tion

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

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 $\langle 0.05 \text{ mg/l} \text{ Cr} \rangle$ 

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Sample C

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Lead (Pb)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Pb and 30 mls Sample	.005	.005	.005
20 mls 1.0 mg/l Pb and 30 mls Sample	.009	.009	.009
20 mls 2.0 mg/l Pb and 30 mls Sample	.018	.018	.018
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actual	Concentra	tion
N.D. mg/l	40.05	_ mg/l	Pb

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

mg/1

Sample C

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Cadmium (Cd)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cd and 30 mls Sample	.032	.032	.032
20 mls 1.0 mg/l Cd and 30 mls Sample	.064	.064	.064
20 mls 2.0 mg/l Cd and 30 mls Sample	.123	.123	.123
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actual	Concentra	tion

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

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N.D.

mq/l

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Sample D

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Copper (Cu)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.008	.007	.008
20 mls 0.5 mg/l Cu and 30 mls Sample	.018	.018	.018
20 mls 1.0 mg/l $\frac{Cu}{}$ and 30 mls Sample	.028	.028	.028
20 mls 2.0 mg/l Cu and 30 mls Sample	.049	.048	.048
e			

X - Intercept = .38

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample D

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Nickel (Ni)

Absorbance Standard Additions .016 .016 .016 20 mls Blank and 30 mls Sample .022 .022 .022 20 mls 0.5 mg/l  $^{
m Ni}$  and 30 mls Sample .028 .028 .028 20 mls 1.0 mg/1  $^{\rm Ni}$  and 30 mls Sample .040 .040 .040 20 mls 2.0 mg/l  $^{\rm Ni}$  and 30 mls Sample

X - Intercept = 1.33

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample D

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Zinc (Zn)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.045	.095	.095
20 mls 0.5 mg/l $\underline{Zn}$ and 30 mls Sample	.139	.138	.138
20 mls 1.0 mg/l $\underline{Zn}$ and 30 mls Sample	.182	182	.183
20 mls 2.0 mg/l Zn and 30 mls Sample	.271	.269	.269
	9		,

X - Intercept = 1.05

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample D

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Chromium, Total (Cr)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample		000	.000
20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample	.007	.007	.007
20 mls 1.0 mg/l _Cr and 30 mls Sample	.014	.014	.014-
20 mls 2.0 mg/l <u>Cr</u> and 30 mls Sample	.028	.028	.028

X - Intercept = .000

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/1 \_\_\_\_ (0.05 mg/1 Cr)

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville
E.P.A. I.D. #MID099124299

Sample D

 $\mbox{\sc Acid}$  digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Lead (Pb)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\frac{Pb}{}$ and 30 mls Sample	.006	.006	.006
20 mls 1.0 mg/l $\underline{Pb}$ and 30 mls Sample	.012	.012	.012
20 mls 2.0 mg/l $\stackrel{\text{Pb}}{=}$ and 30 mls Sample	.017	.017	.017

X - Intercept = .000

 ${\tt N.D.}$  - Not Detected, sample concentration was found to be lower than the detection limit given.

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E.P.A. I.D. #MID099124299

Sample D

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Cadmium (Cd)

Standard Additions	Al	sorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cd and 30 mls Sample	.031	.032	.031
20 mls 1.0 mg/l Cd and 30 mls Sample	.064	.063	.063
20 mls 2.0 mg/l Cd and 30 mls Sample	.117	.117	.117

X - Intercept = .000

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/l  $\underline{\qquad}$   $\underline{\qquad}$ 

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample E

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Copper (Cu)

Standard Additions	A	osorbance	
20 mls Blank and 30 mls Sample	.005	.005	.005
20 mls 0.5 mg/lCu and 30 mls Sample	.015	015	.015
20 mls 1.0 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.025	.025	.025
20 mls 2.0 mg/l Cu and 30 mls Sample	.047	.049	.046

x - Intercept = .23

Sample Concentration	X	Dilution Factor	=	Actual	Concen	tration
0.23 mg/1		Andreas - Andrea		0.23	_ mg/l	<u>Cu</u>

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample Ε

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None Nickel (Ni) Element Analyzed

mq/1

## Standard Additions Absorbance 20 mls Blank and 30 mls Sample .019 .019 .019 .025 20 mls 0.5 mg/l $^{\rm Ni}$ and 30 mls Sample .025 .025 20 mls 1.0 mg/l $\frac{\text{Ni}}{\text{and}}$ and 30 mls Sample .032 .031 .031 20 mls 2.0 mg/l $^{\rm Ni}$ and 30 mls Sample .045 .044 .045 X - Intercept = 1.45Dilution Factor = Actual Concentration Sample Concentration x 1.45 mg/l Ni

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample E

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Zinc (Zn)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.160	.163	.165
20 mls 0.5 mg/l $\frac{2n}{}$ and 30 mls Sample	.211	.213	.212
20 mls 1.0 mg/l $\frac{2n}{}$ and 30 mls Sample	.258	.257	.260
20 mls 2.0 mg/l $^{ m Zn}$ and 30 mls Sample	.350	.346	.351

x - Intercept = 1.71

Sample Concentration	n x	Dilution Factor	<u> </u>	Actual	Concent	tration	
1.71 mg/l				1.71	_ mg/l	Zn	_

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample E

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Chromium , Total (Cr)

Standard Additions	Al	osorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.007	.007	.007
20 mls 1.0 mg/l $\underline{Cr}$ and 30 mls Sample	.014	.014	.014
20 mls 2.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.028	.028	.028
X - Intercept = .000		·	
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
N.D. mg/l	<u> </u>	mg/l _C	r

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

Atomic	: Absorption	Analysis
E P T	oxicity Ext	raction

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample	E

N.D. mg/l

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Pb and 30 mls Sample	.004	.005	.005
20 mls 1.0 mg/l Pb and 30 mls Sample	.009	.009	,008
20 mls 2.0 mg/l Pb and 30 mls Sample	.018	.018	.018
X - Intercept =000			
Sample Concentration x Dilution Factor	= Actua	1 Concentra	ition

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

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**4**0.05

mg/1

₽b

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Sample E

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor NONE

Element Analyzed Cadmium (Cd)

Standard Additions	Al	osorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cd and 30 mls Sample	.037	.037	.037
20 mls 1.0 mg/1 Cd and 30 mls Sample	.072	.072	.072
20 mls 2.0 mg/l Cd and 30 mls Sample	.134	.134	.134

X - Intercept = .000

Sample Concentration x Dilution Factor = Actual Concentration N.D. mg/l -  $\angle 0.02$  mg/l  $\underline{Cd}$ 

N.D. - Not Detected, sample concentration was found to be lower than the detection limit given.

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Sample F

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Copper (Cu)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.024	_024_	_024_
20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.035	_035_	_035_
20 mls 1.0 mg/l Cu and 30 mls Sample	.048	.046	.046
20 mls 2.0 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.067	.068	.068
X - Intercept = 1.05			•
Sample Concentration x Dilution Factor	= Actual	Concentra	ation
1.05 mg/l	1.05	mg/1 <u></u>	Cu

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Sample F

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

<u>Nickel (Ni)</u>

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.125	.125	.125
20 mls 0.5 mg/l $\underline{^{\mathrm{Ni}}}$ and 30 mls Sample	.133	.132	.134
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.140	.140	.140
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.155	.155	.156
X - Intercept = 8.20			
Sample Concentration x Dilution Factor	= Actua	1 Concentr	ation
8.20 mg/1 -	8.2	20  mg/l	li

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Sample F

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

10

Element Analyzed

Zinc (Zn)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.172	.174	.173
20 mls 0.5 mg/l $\underline{\mathrm{Zn}}$ and 30 mls Sample	.222	.221	223
20 mls 1.0 mg/l $\underline{Zn}$ and 30 mls Sample	.268	.270	.270
20 mls 2.0 mg/l $\underline{\mathrm{Zn}}$ and 30 mls Sample	.356	.357	.356
X - Intercept = 1.76			
Sample Concentration x Dilution Factor	= Actual	Concentr	ation
1.76_ mg/1	17.6	_ mg/l _	Zn

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Sample F

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Chromium, Total (Cr)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	_000	_000	.000
20 mls 0.5 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.009	.008	.009
20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample	.016	.015	.017
20 mls 2.0 mg/l <u>Cr</u> and 30 mls Sample	<u>,031</u>	.030	.031
X - Intercept =			

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/l \_\_\_\_\_  $\underline{\sim}$  0.05 mg/l \_\_\_\_\_

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample F

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

Element Analyzed

N.D. mg/1

Lead (Pb)

Standard Additions	Adsordance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Pb and 30 mls Sample	.006	.006	.006
20 mls 1.0 mg/l $\underline{Pb}$ and 30 mls Sample	.011	.012	.011
20 mls 2.0 mg/l Pb and 30 mls Sample	.022	.022	.022
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample F\_\_\_\_

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Cadmium (Cd)

Absorbance Standard Additions \_00 20 mls Blank and 30 mls Sample .000 <u>.001</u> .032 20 mls 0.5 mg/l cd and 30 mls Sample .030 .031 20 mls 1.0 mg/l Cd and 30 mls Sample .060 .060 \_062 20 mls 2.0 mg/l Cd and 30 mls Sample 114 .112 \_\_\_113 X - Intercept = \_\_\_\_.000 Sample Concentration x Dilution Factor = Actual Concentration <0.02 mg/l \_Cd N.D. mg/l

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample G

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Copper (Cu)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.004	.004	.005
20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.014	.015	.015
20 mls 1.0 mg/l Cu and 30 mls Sample	.026	.027	.027
20 mls 2.0 mg/l Cu and 30 mls Sample	.049	.049	.050
X - Intercept = .200			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
0.20 mg/l	0.20	mg/l _C	u

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Sample G

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Nickel (Ni)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.011	.012	.012
20 mls 0.5 mg/l Ni and 30 mls Sample	.021	.022	.022
20 mls 1.0 mg/l Ni and 30 mls Sample	.031	.032	.031
20 mls 2.0 mg/l Ni and 30 mls Sample	.049	.049	.049
X - Intercept = <u>.630</u>			·
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
	0.63	mg/l _N	ı <b>i</b>

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Sample G

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

3.25 mg/1

Zinc (Zn)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.312	.313	.312
20 mls 0.5 mg/l $\underline{\mathrm{Zn}}$ and 30 mls Sample	.360	.360	_360
20 mls 1.0 mg/l $\underline{\mathrm{Zn}}$ and 30 mls Sample	_407	.408	_410
20 mls 2.0 mg/l $\underline{Zn}$ and 30 mls Sample	.480	_479	_480
X - Intercept = 3.25		c .	
Sample Concentration x Dilution Factor	= Actua	1 Concentr	ation
3.25 mg/l	3.2	5 mg/l _	Zn

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Sample G\_\_\_\_

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Chromium, Total (Cr)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.008	.009	.008
20 mls 1.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.016	.017	.016
20 mls 2.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.032	.032	_032
X - Intercept =000			
Sample Concentration x Dilution Factor	= Actual	Concentra	ition
N.D. mg/l	<u>&lt;0.05</u>	mg/l	<u>r</u>

N.D. - Not detected, sample concentration was found to be lower than the the detection limit given.

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Sample G

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

\_None\_

Element Analyzed

N.D. mg/1

Lead (Pb)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	000	.000
20 mls 0.5 mg/l Pb and 30 mls Sample	.004	.005	.004
20 mls 1.0 mg/l Pb and 30 mls Sample	.009	.009	.009
20 mls 2.0 mg/l Pb and 30 mls Sample	.018	.018	.018
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actual	Concentrat	ion

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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 $\angle 0.05$  mg/l Pb

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Sample G

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Cadmium (Cd)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cd and 30 mls Sample	.035	.034	.036
20 mls 1.0 mg/l Cd and 30 mls Sample	070	.070	.071
20 mls 2.0 mg/l Cd and 30 mls Sample	.134	.133	.135
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
N.D. mg/1	<u>&lt;0.02</u>	mg/l _	Cd

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample H

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Copper (Cu)

Standard Additions	AD	sorpance	
20 mls Blank and 30 mls Sample	.005	.005	005
20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.017	.016	.017
20 mls 1.0 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.029	.028	.028
20 mls 2.0 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.052	.051	.052
X - Intercept = .200			
Sample Concentration x Dilution Factor	= Actual	l Concentra	ation
0.20 mg/l -	0.20	mg/l c	lu

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Sample H

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Nickel (Ni)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.069	068	.069
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.076	075	075
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.084	083	084
20 mls 2.0 mg/l Ni and 30 mls Sample	.097	096	096
X - Intercept = <u>4.87</u>			ı
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
mg/l	4.8	37 mg/l _	Ni

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Sample H

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

10

Element Analyzed

Zinc (Zn)

Standard Additions	At	sorbance	
20 mls Blank and 30 mls Sample	.141	.142	138
20 mls 0.5 mg/l $\underline{\mathrm{Zn}}$ and 30 mls Sample	.190	_191	190
20 mls 1.0 mg/l $\underline{\text{Zn}}$ and 30 mls Sample	240	_235	233
20 mls 2.0 mg/l $\underline{\rm Zn}$ and 30 mls Sample	.328	.322	.324
X - Intercept = <u>1.45</u>			
Sample Concentration x Dilution Factor	= Actual	Concentra	ıtion
1.45 mg/l10	14.5	$_{\rm mg/l}$	n

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Sample H

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

<u>None</u>

the detection limit given.

Element Analyzed

Chromium, Total (Cr)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample	.007	.007	.006
20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample	.014	.015	.013
20 mls 2.0 mg/l <u>Cr</u> and 30 mls Sample	.028	.028	.028
X - Intercept = <u>.000</u>			
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
N.D. mg/l	<0.05	mg/l <u>(</u>	Cr

N.D. - Not detected, sample concentration was found to be lower than

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Atomic	Absorpt	cion	Analysis
E.P. To	xicity	Ext	caction

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Sample H

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Lead (Pb)

Standard Additions	Ab	sorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\underline{Pb}$ and 30 mls Sample	.005	.006	.005
20 mls 1.0 mg/l $\underline{Pb}$ and 30 mls Sample	.010	.010	.010
20 mls 2.0 mg/l Pb and 30 mls Sample	.021	.020	.020
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actual	Concentra	ition
N.D. mg/1	<u>&lt;0.05</u>	_ mg/l	Pb

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Η Sample

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

N.D. mg/1

Cadmium (Cd)

Standard Additions	Al	osorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l Cd and 30 mls Sample	.039	.039	.039
20 mls 1.0 mg/l Cd and 30 mls Sample	.078	077	.078
20 mls 2.0 mg/l Cd and 30 mls Sample	<u>.153</u>	_154	.153
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actua	1 Concentra	ation
N.D. mg/1	< 0.02	2_ mg/l <u>Cd</u>	

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

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Sample I

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Copper (Cu)

Standard Additions	Ab	sorbance	
20 mls Blank and 30 mls Sample	.008	.008	.008
20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.020	.020	.020
20 mls 1.0 mg/l $\frac{Cu}{}$ and 30 mls Sample	.032	.032	.032
20 mls 2.0 mg/l Cu and 30 mls Sample	.057	.058	.056
X - Intercept = .32			
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
0.32 mg/l	0.32	mg/l	Cu

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Sample I

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Nickel (Ni)

Standard Additions	Ab	sorbance	
20 mls Blank and 30 mls Sample	.064	.064	.064
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.070	.069	.070
20 mls 1.0 mg/l Ni and 30 mls Sample	.075	.073	.074
20 mls 2.0 mg/l Ni and 30 mls Sample	.082	.082	.082
X - Intercept = 6.25			
Sample Concentration x Dilution Factor	= Actual	Concentra	ation
6.25 mg/1	6.25	mg/l	<u>Ni</u>

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Sample I

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Zinc (Zn)

Standard Additions	Ab	sorbance	
20 mls Blank and 30 mls Sample	.063	.064	.064
20 mls 0.5 mg/l $\underline{\text{Zn}}$ and 30 mls Sample	.108	.108_	108
20 mls 1.0 mg/l $\underline{\text{Zn}}$ and 30 mls Sample	.154	154	.154_
20 mls 2.0 mg/l $\underline{\rm Zn}$ and 30 mls Sample	.239	239	240
X - Intercept =			
Sample Concentration x Dilution Factor	= Actual	Concentra	tion
	0.70	$_{\rm mg/l}$ $_{\rm Z_1}$	1

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Sample I

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Chromium, Total (Cr)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.003	.002	.002
20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample	.010	.009	.010
20 mls 1.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.017	.018	.017
20 mls 2.0 mg/l <u>Cr</u> and 30 mls Sample	.031	.030	.030
X - Intercept =32		•	
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
0.32 mg/l	0.3	32 mg/l <u>(</u>	Cr

Atomi	c Absorpt	ion	Analysis
E.P. 5	roxicity	Extr	action

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample	1
L	

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Lead (Pb)

Standard Additions	Al	osorbance	
20 mls Blank and 30 mls Sample	.000	000	000
20 mls 0.5 mg/l $\underline{Pb}$ and 30 mls Sample	005	004	005
20 mls 1.0 mg/l Pb and 30 mls Sample	_011	009	010
20 mls 2.0 mg/l $\underline{Pb}$ and 30 mls Sample	020	020	<u>_019</u>
X - Intercept = <u>.000</u>			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
N.D. mg/l	<0.05	mg/l Pb	)

 $\ensuremath{\text{N.D.}}$  - Not detected, sample concentration was found to be lower than the detection limit given.

Atomic Absorption Analysis

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E.P. Toxicity Extraction

E.P.A. I.D. #MID099124299-

Sample I

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Cadmium (Cd)

Standard Additions	I	Absorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\frac{\text{Cd}}{}$ and 30 mls Sample	.033	. 033	<u>.035</u>
20 mls 1.0 mg/l $\frac{\text{Cd}}{}$ and 30 mls Sample	<u>. 065</u>	. 066	.069
20 mls 2.0 mg/l $\frac{\text{Cd}}{\text{and}}$ and 30 mls Sample	.125	. 125	.177
X - Intercept =			•

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/1 \_\_\_ <0.02 mg/1 \_Cd

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample J

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Copper (Cu)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.009	.009	.009
20 mls 0.5 mg/l $\underline{\text{Cu}}$ and 30 mls Sample	.021	.021	.021
20 mls 1.0 mg/l Cu and 30 mls Sample	.034	.033	.033
20 mls 2.0 mg/l Cu and 30 mls Sample	.057	.057	.057
X - Intercept = <u>.38</u>			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
	0.38	mg/l	Cu

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Sample J

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

10

Element Analyzed

Nickel (Ni)

Standard Additions	Ab	sorbance	
20 mls Blank and 30 mls Sample	.014	.014	.014
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.022	.022	<u>.022</u>
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.029	.029	.029
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.044	.045	.044
X - Intercept = .95			
Sample Concentration x Dilution Factor	= Actual	Concentra	tion
	9.50	_ mg/l _N	i <u>i</u>

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Sample J

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

10

Element Analyzed

 $0.55 \, \text{mg/l}$ 

Zinc (Zn)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	056	.056	056
20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sample	.101	.101	.101
20 mls 1.0 mg/l $\underline{zn}$ and 30 mls Sample	.153	.155	.153
20 mls 2.0 mg/l $\underline{Zn}$ and 30 mls Sample	.253	. 252	252
X - Intercept = .55			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation

10\_\_\_

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 $5.50 \text{ mg/l} \frac{2n}{2}$ 

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Sample J

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

none

the detection limit given.

Element Analyzed

Chromium Total, (Cr)

Standard Additions	A	bsorbance	٠.
20 mls Blank and 30 mls Sample	.000	.000	_000
20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample	.011	.011	.010
20 mls 1.0 mg/l $\frac{Cr}{}$ and 30 mls Sample	.018	.018	.018
20 mls 2.0 mg/l $\frac{Cr}{}$ and 30 mls Sample	.032	.031	.032
X - Intercept = .000	¢		

N.D. mg/l \_ \_ <0.05 mg/l \_ Cr N.D. - Not detected, sample concentration was found to be less than

Sample Concentration x Dilution Factor = Actual Concentration

Atomic	Absorption	Analysis
E P T	oxicity Ext	raction

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Sample	J
Owinp I C	

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor <u>none</u>

Element Analyzed <u>Lead (Pb)</u>

## Standard Additions

## Absorbance

20 mls Blank and 30 mls Sample	_000	_000	.000
20 mls 0.5 mg/l $\underline{Pb}$ and 30 mls Sample	.005	.006	.005
20 mls 1.0 mg/l $\underline{Pb}$ and 30 mls Sample	.011	.010	.011
20 mls 2.0 mg/l Pb and 30 mls Sample	<u>.021</u>	.020	.020

X - Intercept = \_\_.000

Sample Concentration x Dilution Factor = Actual Concentration

N.D. mg/l  $\underline{\phantom{a}}$   $\underline$ 

N.D. - Not detected, sample concentration was found to be less than the detection limit given.

Atom	ic	Absorp	tion	Analysi	S
E P	ጥረ	nxicity	Eyti	raction	

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Sample	Sample	J
--------	--------	---

N.D. mg/1

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor none

Element Analyzed Cadmium (Cd)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l <u>Cd</u> and 30 mls Sample	.031	.029	.030
20 mls 1.0 mg/l <u>Cd</u> and 30 mls Sample	.060	.060	.060
20 mls 2.0 mg/l <u>Cd</u> and 30 mls Sample	.107	.108	.106
X - Intercept =000			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation

N.D. - Not detected, sample concentration was found to be less than the detection limit given.

William J. Guerrera Stanley Laboratory

< 0.02 mg/1

 $\mathsf{Cd}$ 

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample K

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

 $0.40 \, \text{mg/l}$ 

Copper (Cu)

Standard Additions	Absorbance			
20 mls Blank and 30 mls Sample	.006	.005	005	
20 mls 0.5 mg/l $\underline{Cu}$ and 30 mls Sample	.017	.017	.017	
20 mls 1.0 mg/l $\underline{Cu}$ and 30 mls Sample	.030	.030	030	
20 mls 2.0 mg/l $\underline{Cu}$ and 30 mls Sample	.055	055	055	
X - Intercept = <u>.400</u>				
Sample Concentration x Dilution Factor	le Concentration x Dilution Factor = Actual Concentration			

William J. Guerrera Stanley Laboratory

0.40 mg/l Cu

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample \_ K

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Nickel (Ni)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.030	.030	.030
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	_037_	_038_	-038
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.045	.044	.045
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.059	.059	.059
X - Intercept = 1.95			
Sample Concentration x Dilution Factor	= Actual	Concentra	ation
1.95 mg/l	1.95	_ mg/l	Ni

William J. Guerrera Stanley Laboratory

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample K

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

<u>None</u>

Element Analyzed

Zinc (Zn)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.093	.093	.093
20 mls 0.5 mg/l $\underline{Zn}$ and 30 mls Sample	.100	.102	.100
20 mls 1.0 mg/l $\underline{Zn}$ and 30 mls Sample	.200	.200	.199
20 mls 2.0 mg/l $\underline{Zn}$ and 30 mls Sample	.397_	.398	_398_
X - Intercept = <u>.940</u>			
Sample Concentration x Dilution Factor	= Actual	Concentra	ition
	0.94	mg/l _z	n

Atomic Absorption Analysis

E.P. Toxicity Extraction

Page 171
Stanley Tools - Fowlerville
E.P.A. I.D. #MID099124299

Sample K

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Chromium, Total (Cr)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\underline{Cr}$ and 30 mls Sample	010_	-010	-010
20 mls 1.0 mg/l $\underline{Cr}$ and 30 mls Sample	.029	.020	.039
20 mls 2.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.040	.039	.039
X - Intercept = .000			
Sample Concentration x Dilution Factor = Actual Concentration			
	< 0.05	_ mg/l _	

N.D. - Not given, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample K

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Lead (Pb)

N.D. mg/1

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.000	.000	.000
20 mls 0.5 mg/l $\underline{Pb}$ and 30 mls Sample	.004	.005	.004
20 mls 1.0 mg/l Pb and 30 mls Sample	.010	.011	.011
20 mls 2.0 mg/l Pb and 30 mls Sample	.021	.020	-021
X - Intercept =000		·	
Sample Concentration x Dilution Factor	= Actual	Concentra	tion

N.D. - Not given, sample concentration was found to be lower than the detection limit given.

William J. Guerrera Stanley Laboratory

<0 05 mg/l Pb</pre>

Atomic Absorption Analysis

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

E.P. Toxicity Extraction

Sample K

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed Cadmium (Cd)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample $^{\circ}$	.000	.000	_000
20 mls 0.5 mg/l Cd and 30 mls Sample	.038	.036	037
20 mls 1.0 mg/l <u>Cd</u> and 30 mls Sample	.077	079	077
20 mls 2.0 mg/l Cd and 30 mls Sample	.140	.151	<u>.153</u>
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actua	l Concentr	ation
N.D. mg/1	<u>≺0.02</u>	mg/l <u></u>	<u>:d</u>

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample <u>L</u>

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

0.20 mg/l

Copper (Cu)

Standard Additions	Absorbance		
20 mls Blank and 30 mls Sample	.005	.005	005_
20 mls 0.5 mg/l $\underline{Cu}$ and 30 mls Sample	_018_	.018	_018
20 mls 1.0 mg/1 Cu and 30 mls Sample	.031	.030	.030
20 mls 2.0 mg/l $\underline{Cu}$ and 30 mls Sample	.054	.055	_059
X - Intercept =			
Sample Concentration x Dilution Factor	= Actual	Concentra	ation

100

William J. Guerrera Stanley Laboratory

0.20 mg/l

Atomi	C	Abso	rpt	ion	Ana	lys	is
E.P.	то	xici	ty	Extr	act	ion	

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample	<u> </u>
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Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor 10

Element Analyzed Nickel (Ni)

Standard Additions	At	sorbance	
20 mls Blank and 30 mls Sample	.011	.010	_011_
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.026	.026	.028
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.044	.043	.043
20 mls 2.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.075	.077	.074
X - Intercept = .620			
Sample Concentration x Dilution Factor	= Actua	L Concentra	ation
0.62 mg/1 10	_6.20	mg/l1	Ni

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample <u>L</u>

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Zinc (Zn)

Standard Additions	Al	sorbance	
20 mls Blank and 30 mls Sample	.214	.213	.213
20 mls 0.5 mg/l $\underline{^{ m Zn}}$ and 30 mls Sample	.260	.262	_257_
20 mls 1.0 mg/l $\frac{Zn}{}$ and 30 mls Sample	.305	.306	_308_
20 mls 2.0 mg/l $\underline{^{Zn}}$ and 30 mls Sample	.405	.407	_405
X - Intercept = 2.20			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
2.20 mg/l	2.20	<u>)</u> mg/l	Zn

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample L

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

N.D. mg/1

Chromium, Total (Cr)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.000	.000	000
20 mls 0.5 mg/l <u>Cr</u> and 30 mls Sample	.012	_011_	-012
20 mls 1.0 mg/l <u>Cr</u> and 30 mls Sample	.023	.024	.023
20 mls 2.0 mg/l $\underline{\text{Cr}}$ and 30 mls Sample	.047	.048	.047
X - Intercept =			

N.D. - Not given, sample concentration was found to be lower than the detection limit given.

Sample Concentration x Dilution Factor = Actual Concentration

William J. Guerrera Stanley Laboratory

<0.05 mg/1 \_\_Cr\_\_

Atomic	Absorpt	ion	Analysi	S
E.P. T	oxicity	Exti	action	

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Absorbance

<0.05 mg/l Pb

Sample	I
--------	---

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Lead (Pb)

N.D. mg/l

Standard Additions

#### 20 mls Blank and 30 mls Sample .000 .000 \_000 20 mls 0.5 mg/l pb and 30 mls Sample \_006 \_006 \_007 20 mls 1.0 mg/l Pb and 30 mls Sample <u>.013</u> .012 .014 20 mls 2.0 mg/l $p_b$ and 30 mls Sample .025 .025 .025 X - Intercept = .000Sample Concentration x Dilution Factor = Actual Concentration

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

Atomi	С	Absor	pti	ion	Ana	lysi	S
E.P.	To	xicit	y 1	Extr	act	ion	

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Absorbance

<0.02 mg/l \_cd

Sample	L
--------	---

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Cadmium (Cd)

N.D. mg/1

Standard Additions

#### 20 mls Blank and 30 mls Sample .000 .000 \_.000 20 mls 0.5 mg/1 Cd and 30 mls Sample .043 .042 .043 20 mls 1.0 mg/l Cd and 30 mls Sample .082 .083 .084 20 mls 2.0 mg/l <u>Cd</u> and 30 mls Sample .165 .166 \_.165 X - Intercept = .000Sample Concentration x Dilution Factor Actual Concentration

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample M

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

\_ None

Element Analyzed

Copper (Cu)

# Standard Additions

### Absorbance

20 mls Blank and 30 mls Sample	.011	.011	_011
20 mls 0.5 mg/l Cu and 30 mls Sample	.025	.025	.025
20 mls 1.0 mg/l Cu and 30 mls Sample	.040	.040	.040
20 mls 2.0 mg/l Cu and 30 mls Sample	.069	.069	.069

X - Intercept = .370

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample M

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

0.95

mg/1

Nickel (Ni)

Standard Additions	At	sorbance	
20 mls Blank and 30 mls Sample	.019	.020	020
20 mls 0.5 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.030	029	030
20 mls 1.0 mg/l $\underline{\text{Ni}}$ and 30 mls Sample	.040	040	039
20 mls 2.0 mg/l Ni and 30 mls Sample	.057	057	055
X - Intercept = 0.95			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ition

William J. Guerrera Stanley Laboratory

0.95 mg/1

Ni

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample M\_\_\_\_

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Zinc (Zn)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	280	279	280
20 mls 0.5 mg/l $\underline{z_n}$ and 30 mls Sample	335	_334	333
20 mls 1.0 mg/l $\underline{z_n}$ and 30 mls Sample	.387	.388	.386
20 mls 2.0 mg/l $\underline{z_n}$ and 30 mls Sample	.483	.480	.483
2.65			•

X - Intercept = 2.65

sample Concentration	X	printion ractor	==	ACCUAI	concen	cration
2.65 mg/l		G256		2.65	_ mg/l	Zn

Atomi	С	Absorp	tion	Analysis	
E.P.	To	xicity	Extr	action	

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Samp	le	M

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor

None

Element Analyzed

Chromium, Total (Cr)

Standard Additions	A	bsorbance	
20 mls Blank and 30 mls Sample	.000	_000	.000
20 mls 0.5 mg/l $\frac{Cr}{}$ and 30 mls Sample	.010	.010	.011
20 mls 1.0 mg/1 Cr and 30 mls Sample	.019	.019	.019
20 mls 2.0 mg/l Cr and 30 mls Sample	.037	.037	.036

X - Intercept = .000

 $\ensuremath{\text{N.D.}}$  - Not detected, sample concentration was found to be lower than the detection limit given.

Atomic Absorption Analysis	Stanley	Tools - F	owlerville
E.P. Toxicity Extraction	E.P.A. I	.D. #MIDO	99124299
Sample <u>M</u>			
Acid digested and analyzed by the Method of performed in triplicate.	Standard	l Addition	S
Dilution Factor None			
Element Analyzed Lead (Pb)			
Standard Additions	I	Absorbance	<b>,</b>
20 mls Blank and 30 mls Sample	.000	.000	000
20 mls 0.5 mg/l $\underline{Pb}$ and 30 mls Sample	.006	.005	007
20 mls 1.0 mg/l Pb and 30 mls Sample	.013	.013	012
20 mls 2.0 mg/l $\underline{Pb}$ and 30 mls Sample	.025	.026	026
X - Intercept = .000			

 $\ensuremath{\text{N.D.}}$  - Not detected, sample concentration was found to be less than the detection limit given.

Sample Concentration x Dilution Factor = Actual Concentration

William J. Guerrera Stanley Laboratory

<0.05 mg/l Pb

N.D. mg/l

Stanley Tools - Fowlerville E.P.A. I.D. #MID099124299

Sample M \_\_\_

Acid digested and analyzed by the Method of Standard Additions performed in triplicate.

Dilution Factor None

Element Analyzed Cadmium (Cd)

Standard Additions	Al	sorbance	
20 mls Blank and 30 mls Sample	.000	.000	000
20 mls 0.5 mg/l <u>Cd</u> and 30 mls Sample	.041	_041_	042
20 mls 1.0 mg/1 Cd and 30 mls Sample	.081	.082	.082
20 mls 2.0 mg/l Cd and 30 mls Sample	.156	.156	.156
X - Intercept = .000			
Sample Concentration x Dilution Factor	= Actua	l Concentra	ation
N.D. mg/l	<0.0	2 mg/l _	Cd

N.D. - Not detected, sample concentration was found to be lower than the detection limit given.



# THE STANLEY WORKS

Since 1843

NEW BRITAIN, CONNECTICUT 06050

(203) 225-5111

November 23, 1983

Mr. William D. Ruckelshaus, Administrator U.S. Environmental Protection Agency Washington, D. C. 20460

RE: Stanley Tools - Fowlerville EPA ID #MID099124299

Dear Mr. Ruckelshaus:

The following petition for the delisting of electroplating wastewater treatment sludge, EPA Hazardous Waste Code Number F006, is being submitted to you by The Stanley Works Corporate Laboratory. The Stanley Works is the owner of the Stanley Tools facility located in Fowlerville, Michigan and herein identified as Stanley Tools-Fowlerville.

This is the second and final part of the petition. This part contains the cyanide analyses, and the determination of the oil and grease content of the sludge. Together both parts fulfill the requirements pursuant to Title 40 CFR Part 260.22.

Samples were taken of the underflow from the clarifier as it is being discharged to the surface impoundments for settling. As discussed with Mr. Myles Morse on August 31, 1983, these samples would be representative of our sludge generation in a worst case condition, since the sludge would not be allowed to further settle and age in the surface impoundments.

The samples collected on November 8, 9, 14 and 16, 1983 did not exhibit any significant levels of sulfide and no interference from sulfide was noted during the cyanide analyses. We can now conclude that the sulfide interference present in the samples taken from the surface impoundments on March 17, 1983 is the result of natural bacteriological attack of organic matter in the surface impoundments.

Mr. William D. Ruckelshaus Washington, D.C.

RE: Stanley Tools - Fowlerville EPA ID #MID099124299

The Part II delisting petition certification will be signed by a Corporate Vice President. I gratefully request that any inquiries regarding this petition be referred to me.

Sincerely,

THE STANLEY WORKS

William J. Guerrera Environmental Chemist Stanley Laboratory

1309 Corbin Avenue New Britain, CT 06053

(203) 225-5111 - Ext.5211

The following information listed below has been addressed in Part I of the petition submitted earlier. Part II of the petition will fulfill the requirements pusuant to Title 40 CFR Part 260.22:

Petitioner

Statement of Interest and Need

Proposed Action

Location of the Generating Facility

Description of Manufacturing Processes, Raw Materials Used and Assessment of Operations

General Description of Wastewater Treatment Operations

The Estimated Sludge Generation

Discussion of Factors Delineated in Criteria for Listing Hazardous Waste

1. Name and Address of the Laboratory performing the testing.

The Stanley Works Corporate Laboratory 1309 Corbin Avenue New Britain, CT 06053

- Name of persons sampling and testing the waste.
  - a) Sampling Reza Rejaei, Stanley Tools, Fowlerville

The underflow from the clarifier was sampled every half hour during the time period when treated cyanide wastewater was being pumped to the clarifier from the cyanide treatment tanks. The samples were collected and composited in a plastic bucket and a one gallon sample of the composite was sent to the Corporate Laboratory arriving the day after it was collected for analysis.

b) Testing - William J. Guerrera, The Stanley Works Laboratory

Mr. Guerrera performed the deionized water extractions and the oil and grease determinations on the samples. The deionized water extractions were started on the same day that the samples arrived at the Laboratory. The procedure used was identical to the procedure outlined in the E.P. Toxicity Extraction Procedure with the exception that no acid was added to the sample and the total volume of deionized water used was equivalent to twenty (20) times the weight of the sludge sample charged to the extractor. The determination of the oil and grease content of the sludge was also performed on the same day that the samples arrived at the Laboratory utilizing a Gravimetric, Separatory Funnel Freon Extraction.

Testing - Philip L. Talarico, The Stanley Works Laboratory

The wet chemical analyses were performed by Mr. Talarico. Total Cyanide, Amenable Cyanide and Leachable Cyanide were analyzed by the acid distillation method. Total and Amenable Cyanide determinations were performed on the same day that the samples arrived at the Laboratory. The Leachable Cyanide determinations were performed at the end of the twenty-four (24) hour extraction.

- 3. Sampling and Testing Data:
  - a) Sampling was performed on the following dates:

H-11/8/83, 11 AM- 3 PM G-11/14/83, 8 AM-12 PM K-11/9/83, 10 AM- 2 PM L-11/16/83, 1 PM- 5 PM

b) Total, Amenable and Leachable Cyanide analyses were performed on the following dates:

11/9/83 11/15/83 11/18/83 11/10/83 11/16/83 11/11/83 11/17/83

c) Oil and grease determinations were made on the following dates:

11/9/83 11/10/83 11/17/83

# 4. Sampling Methodology:

As discussed in 2A Sampling, the underflow from the clarifier was sampled each half hour during the time period when treated cyanide wastewater was being pumped to the clarifier for pH adjustment and further precipitation of metals. The sampling was accomplished by opening the blowdown valve and collecting a sample from the underflow. Each sample collected during the discharge cycle was placed in a covered plastic bucket. At the end of the cycle, the samples in the bucket were mixed well and a one (1) gallon composite sample was poured off. The sample was delivered using an overnight delivery service and arrived at the Laboratory for analysis on the following day.

The flow from the rinse waters following process operations that contain cyanide are fairly steady. The cyanide bearing rinse waters are pumped to the cyanide retention tanks for treatment. These tanks, in which treatment is performed, also act as an equalization basin for the cyanide bearing discharges. At the present time, there are three (3) cyanide retention tanks, each tank holds approximately 32,000 gallons. When production is at its peak, approximately 80,000 gallons of cyanide wastewater is generated per week. The cyanide wastewater is pumped to an empty retention tank until the level reaches the full capacity marking. At that point, the cyanide wastewater is directed to another empty retention tank and treatment is started on the full tank. After the completion of the treatment cycle, the treated wastewater is slowly pumped to the clarifier. Approximately one-half the volume of the retention tank is bled into the clarifier over a 4 hour period. The treated wastewater that remains in the retention tank is then slowly bled into the clarifier on the following day. The procedure is then repeated on another retention tank that has reached full capacity.

Based upon the above described operation, the monitoring and sampling of the underflow from the clarifier during the time period when the treated wastewater is being bled into the clarifier would constitute a representative sampling of the cyanide discharges from the clarifier.

### 5. Sample Handling & Testing Methodology:

The samples were kept in sealed Nalgene bottles at all times. At the time of testing, each sample was well mixed with a paddle mixer, and a portion of the sample slurry was drawn off using Tygon tubing and a vacuum line. For the Cyanide analyses, the slurry was collected in pre-weighed 500 ml Nalgene bottles which were covered to prevent evaporation losses. A minimum of 100 grams of slurry was initially taken for each of the cyanide analyses.

The slurry samples were subjected to a Deionized Water E.P. Toxicity Extraction Procedure to determine the amount of leachable cyanide present. This procedure is similar to the E.P. Toxicity Extraction Procedure outlined in, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Method 1310. The exception being that no acid is added to the sample, and twenty (20) times the sample weight of deionized water is added to the extractor at the start of the extraction. A Millipore Hazardous Waste Filtration Unit using a pre-weighed 142 mm, 0.45 micron filter pad and nitrogen as the pressurizing gas was incorporated to achieve the solid-liquid separation. The liquid portion of the samples was collected in glass 500 ml Erlenmyer flasks and were stoppered immediately after the liquid flow ceased and the pressurizing nitrogen gas evolved from the filter unit. Liquid fractions from the initial separation were preserved with sodium hydroxide to a pH of greater than 11.0, and were stored at 4°C for future usage. The remaining solid portion was evaluated for particle size. The solid sample along with the filter pad and the support screen were placed in a covered Petri dish and the solids were immediately weighed to the nearest 0.1 mg. After weighing, the solid samples were introduced into a suitable extractor along with twenty (20) times their weight of deionized water. The agitation was started and the initial pH of the solution was measured. The agitation was continued for a 24-hour period. At the end of the 24-hour period, the pH was measured and the agitation was stopped. The extracted solution was then introduced into the Hazardous Waste Filtration Unit and the solid and liquid portions were separated using a 142 mm, 0.45 micron filter pad and nitrogen gas for pressurization. The resultant filtrate was collected in a 1000 ml glass Erlenmyer flask and combined with the initial filtrate obtained from the initial solid-liquid separation. The combined solution was then analyzed for cyanide content in accordance with the procedures outlined in the, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", U.S. EPA Publication #SW-846, Second Edition, July 1982, Method 9019.

Samples of the slurry were also collected and analyzed for both total and amenable cyanide in accordance with the test method referenced above.

Samples were also collected and evaluated for oil and grease content in accordance with the procedures outlined in the, "Methods for Chemical Analyses of Water and Waste", U.S. EPA Publication #EPA 600/4-79-020, March 1979, Method 413.1, STORET No. 00556. This method incorporates the use of Freon 113 as the extraction solvent in a separatory funnel extraction. The amount of Freon extractable matter is determined gravimetrically.

Approximately 1 liter from each of the well mixed slurry samples was drawn off for testing. The sample was placed in a beaker and the pH of the slurry was adjusted to pH 2.0 with hydrochloric acid. The pH adjusted sample was then transferred to a 2000 ml separatory funnel. The beaker was then thoroughly rinsed out with 30 mls of Freon 113, then the washings were transferred to the separatory funnel. The sample was extracted by shaking vigorously for 2 minutes. Then the layers were allowed to separate. While the layers were settling, a clean 250 ml boiling flask was weighed up. The settled solvent layer was then passed through a funnel with a solvent moistened Whatman #40 filter paper and collected in the tared 250 ml flask. The aqueous slurry sample in the separatory funnel was extracted twice more with additional portions of fresh solvent. All the Freon 113 extracts were collected in the same boiling flask. The tip of the separatory funnel, the filter paper, and then the funnel, were rinsed with 20 mls more of fresh solvent, the washings were collected in the boiling flask. The flask was gently heated in a water bath at  $50^{\circ}\text{C}$  until all the solvent was evaporated off. The flask was then quickly removed from the water bath and the outside of the flask was wiped to remove any moisture or fingerprints remaining on the flask. The flask was cooled in a desiccator for 1/2 hour and then reweighed. A blank sample utilizing the same volume of Freon 113 as required for the sample extraction was also tested in this manner. The amount of Freon 113 extractable matter was then calculated from the weights obtained and initial volume of slurry sample used.

#### 6. Testing Results:

The results of cyanide analyses and the oil and grease determinations have been tabulated on the pages following. The cyanide and the oil and grease determination have both been reported in mg/l. Blank and standard reference samples were analyzed in both the cyanide analyses and the oil and grease determinations. The reagents used to prepare the reference standards were all of reagent grade purity. The cyanide was analyzed titrimetrically while the oil and grease determinations were made gravimetrically.

- 7. Names and Model Numbers of the Instruments Used:
  - a) Mettler H31 Electronic Balance with Sensitivity to 0.1 mg.
  - b) Orion Model 501 Digital pH Meter.
  - c) Millipore Hazardous Waste Filtration Unit Catalog #YT30142 HW.
  - d) Millipore 0.45 Micron Membrane Filters, 142 mm Diameter, Catalog #HAWP14250.
  - e) SGA Scientific, Cyanide Distillation Apparatus, Referenced in ASTM Test Method D2036, Catalog #JD-1360.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and, that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sincerely,

THE STANLEY WORKS

Richard H. Ayers

Group Vice President

EPA I.D.# MID099124299

The analytical data presented on the following pages has been developed by The Stanley Works Corporate Laboratory. Included in the data is a summary sheet of all the analyses performed on the samples and individual data sheets detailing both sample and standard values obtained for Total Cyanide, Leachable Cyanide, and Cyanide Amenable to Chlorination. The results of the Freon Extractable Oil and Grease determinations are also included in the data.

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample 1.00 mg/l Cyanide Standard

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 500 mls

Distillate Sample Titrated 250 mls

Sample Titration mls AgNO<sub>3</sub> Used - 0.67 = A

Blank Titration mls AgNO<sub>3</sub> Used - 0.17 = B

Calculations:

Cyanide Concentration, mg/l =  $\frac{A-B}{mls\ Original}$  x 1000 x  $\frac{250}{mls\ Distillate}$ Sample Titrated

Total Cyanide Concentration = 1.00 mg/l CN

Percent Recovery - 100%

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample 273.0 mg/l Cyanide Standard

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 25 mls

Distillate Sample Titrated 250 mls

Sample Titration mls AgNO<sub>3</sub> Used - 6.83 = A

Blank Titration mls AgNO<sub>3</sub> Used - 0.17 = B

Calculations:

Cyanide Concentration, mg/l =  $\frac{A-B}{mls\ Original}$  x 1000 x  $\frac{250}{mls\ Distillate}$  Sample Titrated

Cyanide Concentration, mg/l =  $\frac{6.83 - 0.17}{25}$  x 1000 x 250

Total Cyanide Concentration = 266.4 mg/l CN

Percent Recovery - 97.6%

Stanley Tools - Fowlerville EPA I.D. #MID099124299

	•			
Sample	G			
Acid Dist	illation Utilizing	a Titrimetric End-	Point Dete	emination.
Titrant:	Silver Nitrate , (A	gNO <sub>3</sub> ) 0.0192N, 1 m	1 = 1 mg Cy	yanide (CN
Original	Sample Size 10	00 mls		
Distillat	e Sample Titrated _	250 mls		
	tration mls AgNO <sub>3</sub> U			
Calculati	ons:			
Cyanide C	oncentration, mg/l	= A-B x 1000 mls Original Sample	x 250 mls Di Titrat	
Cyanide C	oncentration, mg/l	= 0.26 - 0.10	x 1000 x	250
		100		250
Total Cya	nide Concentration	= 1.60 mg/l	CN	

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample	Н	
Acid Dist	illation Utilizing a Titrimetric End-Point Determ	mination.
Titrant:	Silver Nitrate , (AgNO <sub>3</sub> ) 0.0192N, 1 ml = 1 mg Cya	anide (CN
Original	Sample Size 100 mls	
Distillat	e Sample Titrated 250 mls	
	itration mls $AgNO_3$ Used - $\frac{1.27}{0.14} = B$	
Calculati	ions:	
Cyanide C	Concentration, $mg/l = \frac{A-B}{mls \ Original} \times \frac{250}{mls \ Distance}$ Sample Titrated	
Cyanide C	Concentration, $mg/l = 1.27 - 0.14 \times 1000 \times$	250
	100	250
Total Cya	anide Concentration = 11.3 mg/l CN	

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample Acid Distillation Utilizing a Titrimetric End-Point Determination. Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN) Original Sample Size 100 mls Distillate Sample Titrated 250 mls Sample Titration mls AgNO<sub>3</sub> Used - 1.69 = A Blank Titration mls AgNO<sub>3</sub> Used - 0.14 = B Calculations: Cyanide Concentration,  $mg/l = A-B \times 1000 \times 250$ mls Original mls Distillate Sample Titrated Cyanide Concentration,  $mg/l = 1.69 - 0.14 \times 1000 \times 250$ 100 250

Total Cyanide Concentration = 15.5 mg/l CN

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample <u>L</u>	
Acid Distillation Utilizing a Titrimetric End-Point Dete	rmination.
Titrant: Silver Nitrate , (AgNO <sub>3</sub> ) 0.0192N, 1 ml = 1 mg C	yanide (CN
Original Sample Size <u>200</u> mls	
Distillate Sample Titrated 250 mls	
Sample Titration mls $AgNO_3$ Used - 1.85 = A	
Blank Titration mls AgNO <sub>3</sub> Used - $0.14 = B$	
Calculations:	
Cyanide Concentration, mg/l = $\frac{A-B}{mls\ Original}$ x 1000 x $\frac{250}{mls\ Original}$ mls Di Sample Titrat	stillate ed
Cyanide Concentration, $mg/l = 1.85 - 0.14 \times 1000 x$	250
	250
Total Cyanide Concentration = 8.55 mg/l CN	

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample G

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size <u>100</u> mls

Distillate Sample Titrated 250 mls

Chlorinated Sample Titration mls AgNO<sub>3</sub> Used - 0.26 = C

Blank Titration mls AgNO<sub>3</sub> Used - 0.10 = B

Calculations:

Cyanide in Chlorinated Sample,  $mg/1 = C-B \times 1000 \times 250$ 

mls mls

Original Distillate
Sample Titrated

Cyanide in Chlorinated Sample,  $mg/1 = 0.26 - 0.10 \times 1000 \times 250$ 

100 250

Chlorinated Sample = 1.60 mg/l CN

Amenable Cyanide = Total Cyanide - Chlorinated Cyanide

0 mg/1

1.60 mg/l

1.60 mg/l

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 100 mls

Distillate Sample Titrated 250 mls

Chlorinated Sample Titration mls AgNO, Used -

0.14 Blank Titration mls AgNO<sub>3</sub> Used -

Calculations:

Cyanide in Chlorinated Sample, mg/l = C-Bx 1000 x 250 mls mls Distillate

Original Sample Titrated

250

0.82 - 0.14 xCyanide in Chlorinated Sample, mg/l = 250

100 Chlorinated Sample = 6.8 mg/1 CN

Amenable Cyanide = Total Cyanide - Chlorinated Cyanide

4.5 mg/l11.3 mg/l 6.8 mg/l

Stanley Tools - Fowlerville
EPA I.D. #MID099124299

Sample K

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 100 mls

Distillate Sample Titrated \_\_250 mls

Chlorinated Sample Titration mls AgNO $_3$  Used -  $\frac{1.32}{}$  = CBlank Titration mls AgNO $_3$  Used -  $\frac{0.14}{}$  = B

Calculations:

Cyanide in Chlorinated Sample, mg/l =  $\frac{C-B}{mls}$  x 1000 x  $\frac{250}{mls}$  Original Distillate Sample Titrated

Chlorinated Sample = 11.8 mg/l CN

Amenable Cyanide = Total Cyanide = Chlorinated Cyanide  $\frac{3.7 \text{ mg/l}}{15.5 \text{ mg/l}} = \frac{11.8 \text{ mg/l}}{11.8 \text{ mg/l}}$ 

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample L

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 m1 = 1 mg Cyanide (CN)

Original Sample Size 200 mls

Distillate Sample Titrated 250 mls

Chlorinated Sample Titration mls  $AgNO_3$  Used - 0.50 = C

Blank Titration mls  $AgNO_3$  Used - 0.14 = B

Calculations:

Cyanide in Chlorinated Sample,  $mg/l = \frac{C-B}{mls} \times 1000 \times \frac{250}{mls}$ Original Distillate

Sample Titrated

Cyanide in Chlorinated Sample, mg/l = 0.50 - 0.14 x 1000 x 250

200 250

Chlorinated Sample = 1.80 mg/l CN

Amenable Cyanide = Total Cyanide - Chlorinated Cyanide

6.75 mg/1

8.55 mg/l

1.80 mg/1

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample <u>G</u>

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 500 mls

Distillate Sample Titrated 250 mls

Sample Titration mls AgNO<sub>3</sub> Used - 0.30 = A

Blank Titration mls  $AgNO_3$  Used - 0.10 = B

Calculations:

Cyanide Concentration, mg/l =  $\frac{A-B}{mls\ Original}$  x 1000 x  $\frac{250}{mls\ Distillate}$  Sample Titrated

Cyanide Concentration,  $mg/1 = \frac{0.30 - 0.10}{500} \times 1000 \times \frac{250}{250}$ 

Leachable Cyanide Concentration = 0.40 mg/l CN

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample	H
Sample	H

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 500 mls

Distillate Sample Titrated 250 mls

Sample Titration mls AgNO<sub>3</sub> Used - 0.27 = A

Blank Titration mls AgNO<sub>3</sub> Used - 0.17 = B

### Calculations:

Cyanide Concentration, mg/l =  $\frac{A-B}{mls\ Original}$  x 1000 x  $\frac{250}{mls\ Distillate}$  Sample Titrated

Cyanide Concentration,  $mg/1 = 0.27 - 0.17 \times 1000 \times 250$ 500 250

Leachable Cyanide Concentration = 0.20 mg/l CN

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample	K

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size  $\frac{500}{\text{mls}}$  mls

Sample Titration mls  $AgNO_3$  Used - 0.29 = ABlank Titration mls  $AgNO_3$  Used - 0.17 = B

# Calculations:

Cyanide Concentration, mg/l =  $\frac{A-B}{mls\ Original}$  x 1000 x  $\frac{250}{mls\ Distillate}$   $\frac{mls\ Distillate}{Titrated}$  Cyanide Concentration, mg/l =  $\frac{0.29}{mls\ Distillate}$   $\frac{0.29}{mls\ Distillate}$   $\frac{0.29}{mls\ Distillate}$ 

500

Leachable Cyanide Concentration =  $\frac{0.24}{\text{mg/l}}$  mg/l CN

William J. Guerrera Stanley Laboratory

250

Stanley Tools - Fowlerville EPA I.D. #MID099124299

Sample L

Acid Distillation Utilizing a Titrimetric End-Point Determination.

Titrant: Silver Nitrate ,  $(AgNO_3)$  0.0192N, 1 ml = 1 mg Cyanide (CN)

Original Sample Size 473.5 mls

Distillate Sample Titrated 250 mls

Sample Titration mls AgNO<sub>3</sub> Used - 0.23 = A

Blank Titration mls AgNO<sub>3</sub> Used - 0.16 = B

Calculations:

Cyanide Concentration, mg/l =  $\frac{A-B}{mls\ Original}$  x 1000 x  $\frac{250}{mls\ Distillate}$  Sample Titrated

Cyanide Concentration,  $mg/1 = 0.23 - 0.16 \times 1000 \times 250$ 473.5

Leachable Cyanide Concentration = 0.15 mg/l CN

Oil and Grease Analysis Freon 113 Solvent Residue Stanley Tools - Fowlerville EPA I.D.# MID099124299

Gravimetric, Separatory Funnel Freon 113 Extraction

# Sample - Freon 113 Extraction Solvent

Volume of Sample Extracted - 1000 mls

Weight of Flask & Residue - 110.0731 gm Weight of Flask - 110.0730 gm Weight of Residue - 0.0001 gm

Weight of Residue For Blank - 0.1 mg

Stanley Tools - Fowlerville EPA I.D.# MID099124299

Gravimetric, Separatory Funnel Freon 113 Extraction

Sample 410.	0 mg/l	Freon	Extractable	Oil	Standard
Volume of Sampl	e Used	45A	500	mls	
Volume of Acid	Added	_	1.5	mls	
Total Volume Ex	tracted	-	501.5	mls	
Weight of Flask	and Residu	ue –	113.1467	gm	
Weight of Flask			112.9437	gm	•
Weight of Sampl	e Residue	-	0.2030	gm	

#### Calculations:

Total Oil and Grease, mg/l = Weight of Sample Residue-Weight of Solvent Blank Residue\*

Total Volume Extracted

Total Oil and Grease = 
$$\frac{203.0 \text{ mg} - 0.1 \text{ mg}}{0.5015}$$
Total Oil and Grease - 
$$404.6 \text{ mg/l}$$
Percent Recovery - 
$$98.7\%$$

\* A solvent blank was analyzed to determine the residue from an equivalent volume of extraction solvent. When one liter of triple distilled Freon 113 was extracted, the residue was found to be 0.1 mg.

Stanley Tools - Fowlerville EPA I.D.# MID099124299

Gravimetric, Separatory Funnel Freon 113 Extraction

Sample	G			
	Sample Used		1000 100	mls mls
	me Extracted	_	1100	mls
Weight of	Flask and Residue	<del> </del>	110.1248	gm
Weight of	Flask	-	110.0680	gm
Weight of	Sample Residue	_	0.0568	gm

#### Calculations:

Total Oil and Grease, mg/l = Weight of Sample Residue-Weight of Solvent Blank Residue\*

Total Volume Extracted

Total Oil and Grease = 
$$\frac{56.8 \text{ mg} - 0.1 \text{ mg}}{1.100 \text{ l}}$$

Total Oil and Grease -  $51.6 \text{ mg/l}$ 

<sup>\*</sup> A solvent blank was analyzed to determine the residue from an equivalent volume of extraction solvent. When one liter of triple distilled Freon 113 was extracted, the residue was found to be 0.1 mg.

Stanley Tools - Fowlerville EPA I.D.# MID099124299

Gravimetric, Separatory Funnel Freon 113 Extraction

Sample		H			
Volume	of	Sample Used	-	990	mls
Volume	of	Acid Added	_	68	mls
Total V	/ol	ıme Extracted	wie	1058	mls
Weight	of	Flask and Residue	_	110.1382	gm
Weight	of	Flask		110.0943	gm
Weight	of	Sample Residue	-	0.0439	gm

#### Calculations:

Total Oil and Grease, mg/l = Weight of Sample Residue-Weight of Solvent Blank Residue\*

Total Volume Extracted

Total Oil and Grease = 
$$43.9 \text{ mg} - 0.1 \text{ mg}$$
  
 $1.058 \text{ l}$   
Total Oil and Grease -  $41.4 \text{ mg/l}$ 

<sup>\*</sup> A solvent blank was analyzed to determine the residue from an equivalent volume of extraction solvent. When one liter of triple distilled Free 113 was extracted, the residue was found to be 0.1 mg.

Stanley Tools - Fowlerville EPA I.D.# MID099124299

Gravimetric, Separatory Funnel Freon 113 Extraction

Sample				
Volume of	Sample Used		1010	mls
Volume of	Acid Added		95	mls
Total Volu	me Extracted		1105	mls
			·	
Weight of	Flask and Residue	-	110.4540	gm
Weight of	Flask	-	110.3946	дm
Weight of	Sample Residue		0.0594	gm

#### Calculations:

Total Oil and Grease, mg/l = <u>Weight of Sample Residue-Weight of Solvent Blank Residue\*</u>

Total Volume Extracted

Total Oil and Grease = 
$$59.4 \text{ mg} - 0.1 \text{ mg}$$
  
 $1.105 \text{ l}$   
Total Oil and Grease -  $53.7 \text{ mg/l}$ 

\* A solvent blank was analyzed to determine the residue from an equivalent volume of extraction solvent. When one liter of triple distilled Freon 113 was extracted, the residue was found to be 0.1 mg.

Stanley Tools - Fowlerville EPA I.D.# MID099124299

Gravimetric, Separatory Funnel Freon 113 Extraction

Sample <u>L</u>	No.
Volume of Sample Used	- 1000 mls
Volume of Acid Added	- 100 mls
Total Volume Extracted	- 1100 mls
Weight of Flask and Re	sidue - 110.1260 gm
Weight of Flask	- 110.0720 gm
Weight of Sample Resid	ue - 0.0540 gm

#### Calculations:

Total Oil and Grease, mg/l = Weight of Sample Residue-Weight of Solvent Blank Residue\*

Total Volume Extracted

Total Oil and Grease = 
$$54.0 \text{ mg} - 0.1 \text{ mg}$$
  
 $1.100 \text{ l}$   
Total Oil and Grease -  $49.0 \text{ mg/l}$ 

<sup>\*</sup> A solvent blank was analyzed to determine the residue from an equivalent volume of extraction solvent. When one liter of triple distilled Freon 113 was extracted, the residue was found to be 0.1 mg.

Analysis Data

Stanley Tools - Fowlerville EPA I.D.# MID099124299

	CYANIDE	ANALYSES, mg/	OIL AND GREASE, mg/l	
SAMPLE	TOTAL	AMENABLE*	<u>LEACHABLE</u>	FREON 113 EXTRACTABLE
G	1.60	0.00	0.40	51.6
Н	11.3	4.50	0.20	41.4
K	15.5	3.70	0.24	53.7
L	8.55	6.75	0.15	49.0

#### \* AMENABLE TO CHLORINATION

Sample H, 11/8/83, 11 a.m. - 3 p.m. Sample K, 11/9/83, 10 a.m. - 2 p.m. Sample G, 11/14/83, 8 a.m. - 12 p.m. Sample L, 11/16/83, 1 p.m. - 5 p.m.



### THE STANLEY WORKS

Since 1843

NEW BRITAIN, CONNECTICUT 06050

(203) 225-5111

February 29, 1984

Ms. Barbara L. Bush Office of Solid Waste (WH-562) U. S. Environmental Protection Agency Washington, D. C. 20460

Re: Delisting Petition #0533

Dear Ms. Bush:

Enclosed please find the additional information you have requested to complete the review of the Delisting Petition (#0533) submitted by The Stanley Works Corporate Laboratory for the Stanley Tools-Fowlerville facility. I have attached the Material Safety Data Sheets for the chemical compounds used in our finishing process that may enter the waste stream. You will note that I have not included the data sheets on the basic raw materials that make up the primary plating process solutions such as, sodium cyanide, caustic soda, copper metal anodes, nickel sulfate hexahydrate, nickel chloride hexahydrate, boric acid, nickel metal anodes, chromic acid, sulfuric acid, and insoluble lead metal anodes. Much information on the safety and toxicity of these materials can be readily obtained from a variety of reference materials.

The additional information you have asked for, will be answered in Paragraph form.

### 1. Past Disposal Practices:

The Stanley Works acquired the Stanley Tools - Fowlerville facility in January of 1980. The metal hydroxide sludge was accumulated in the surface impoundments until October 1980, when approximately 97,000 gallons of metal hydroxide sludge was pumped out of the surface impoundments by Chem-Met Services of Wyandotte, Michigan and transported to their facility for disposal. The remaining sludge was left to accumulate in the surface impoundments and became regulated as hazardous waste Code #F006 under RCRA on November 19, 1980.

Ms. Barbara L. Bush Office of Solid Waste (WH-562) U. S. Environmental Protection Agency Washington, D. C. 20460

Re: Delisting Petition #0533

#### 2. Current Disposal Practices:

Chem-Met Services, EPA ID# MID096963194, is still being contracted as the disposal firm for the F006 waste stored in the surface impoundments. Once yearly, the surface impoundments are pumped out. The F006 sludge is transported to Chem-Met's facility where the sludge slurry is dewatered and the resultant solid sludge is combined with other solid metal hydroxide sludge of the same hazardous waste code classification. The solid material is then transported to Wayne County #2 Landfill for disposal.

#### Proposed Disposal Practice:

In the event that the F006 waste is delisted, the sludge would be handled as a solid waste and would be sent to Chem-Met Services for dewatering. The solid sludge that remains after dewatering would be sent to an engineered landfill for proper disposal.

#### 4. Tests for Characteristic Hazardous Waste:

Ignitability Characteristic; The F006 sludge would not exhibit the characteristic of ignitability because the material is an aqueous slurry with approximately 97% water and 3% solid metal hydroxide sludge which does not readily ignite nor support combustion. This material does not exhibit a Flash Point less than  $140^{\circ}\mathrm{F}$ .

Corrosivity Characteristic; The F006 sludge does not exhibit the characteristic of corrosivity. When the pH of the sludge was measured, it was found to fall within the 9.03 to the  $10.50~\rm pH$  range which is within the non-corrosive pH range.

Ms. Barbara L. Bush
Office of Solid Waste (WH-562)
U. S. Environmental Protection Agency
Washington, D. C. 20460

Re: Delisting Petition #0533

Reactivity Characteristic; The F006 sludge does not exhibit the characteristic of reactivity. The sludge does not react violently with water and when exposed to mild acids or alkalies does not generate toxic gases or vapors. Analysis of the sludge indicates that the free cyanide level in the sludge is well below 10 mg/l limit.

5. Total Metal Analysis, Arsenic, Mercury & Selenium:

The total metals analysis for arsenic, mercury, and selenium has been provided in Part I of the Delisting Petition. This information is available on Pages 7 and 55 of Part I of the Petition.

6. Total Organic Carbon Analysis:

Attached, with this letter, are the results of the Total Organic Carbon analysis (TOC) performed upon sludge samples from both the clarifier blowdown and the surface impoundment system. As discussed with Mr. Morse in our phone conversation of January 27, 1984, five representative samples would have to be submitted for TOC analysis. One sample being a composite sample of the clarifier blowdown, and the remaining four being composite samples taken from each of the four surface impoundments. Due to extremely cold weather conditions, two of the surface impoundments have frozen over making composite sampling of those two surface impoundments virtually impossible. I advised Mr. Morse of this situation and he had suggested that we forego the composite sampling of those two impoundments and obtain grab samples from them.

Ms. Barbara L. Bush Office of Solid Waste (WH-562) U. S. Environmental Protection Agency Washington, D. C. 20460

Re: Delisting Petition #0533

The sampling was performed on February 7, 1984. Composite samples were obtained from surface impoundments Numbers 3 and 4 and grab samples were taken from surface impoundments Numbers 1 and 2. A composite of the clarifier blowdown was obtained from grab samples taken during the blowdown periods.

You will also note that along with the TOC analysis, the samples were also tested to determine the presence of the metal Thallium. Though Thallium is not listed as an EP Toxic Metal, a review of the Material Safety Data Sheets has alerted us to the fact that one of the products in use, Isobrite 607 used in our cyanide copper plating solution as an additive, contains small amounts of Thallium Carbonate. Each sample was analyzed for Total Thallium based upon the dosage rate of Isobrite 607, (one-third gallon per day added to a 5000 gallon plating tank with a small dragout rate), we would estimate that the amount of Thallium that may enter the sludge would be extremely small.

I am also including a summary sheet with this letter, detailing the analyses performed and the results of those analyses.

I will once again remind both you and Mr. Morse that the Stanley Tools-Fowlerville facility has received a request from EPA Region V for the submission of their Part B Permit application. The submission date is targeted for July 15, 1984.

I hope this additional information will assist you in completing your review of the petition in a timely manner. Should any additional information regarding this petition be needed, please contact me as soon as possible.

Sincerely,

William J/. Guerrera Environméptal Chemist

Stanley Zaboratory 1309 Corbin Avenue

New Britain, CT 06053 (203) 225-5111 - Ext.5211

William J. Guerrera

Page 5

Ms. Barbara Bush

RE: Delisting Petition #0533

#### Analysis Data:

Sample #	Туре	TOC	mg/l	Thallium (T1)
1000	Blowdown Composite	1,400		2.0*
1001	Lagoon #1, Grab	51		2.0*
1002	Lagoon #2, Grab	3,100		2.0*
1003	Lagoon #3, Composite	1,300		2.0*
1004	Lagoon #4, Composite	100		2.0*

<sup>\* -</sup> Not detected, concentration found to be lower than the detection limit given.

The analytical data presented on this page has been developed by Baron Consulting Company. The Thallium analysis was performed on a Perkin-Elmer 503 Atomic Absorption Spectrophotometer. The Thallium values were quantified by the method of standard additions. The TOC analysis was performed in accordance with Method 415.1 described in EPA-600/4-79-020 STORET No. 00680.

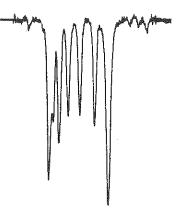
## BARON CONSULTING CO.

HARRY AGAHIGIAN, Ph.D., DIRECTOR

## analytical services

P.O. BOX 663, ORANGE CT. 06477

March 12, 1984



To:

Mr. W.J. Guerrera

Stanley Works P.O. Box 1308

New Britain, Conn.

06050

From:

Robert O. Blake, Jr.

Re:

Elemental Analysis

P.O. # C29583

BC# 39387

Sample	TOC	Т1
1000	1,400	ND/2.0
1001	51	
1002	3,100	<b>į</b> -
1003	1,300	,
1004	100	<b>)</b> (

These Samples were digested and run by Atomic Absorption using a Perkin-Elmer 503. The values for Tl were based on values obtained using the method of standard addition.

Sample homogeneity maybe a problem.

All values are expressed in mg/l.

Please review the data and contact us if you wish more information.

Robert O. Blake Jr. Baron Consulting Co.

ROB/dc

This report is submitted with the understanding that it is not to be reproduced for advertising or other purposes over our signature without express written permission from us. We do not accept any liability concerning the use of these results.

NOT RESPONSIBLE FOR SAMPLES LEFT OVER 30 DAYS AFTER RECEIPT OF REPORT.

## MATERIAL SAFETY DATA SHEET

#### SECTION I

	product name or number Isobrite 607	Day — (313) 437-8161
·	MANUFACTURER'S NAME ALLIED-KELITE Products, Division of the Richardson Co.	Nite - (313) 644-5626
and the Coulomb	ADDRESS (Number, Street, City, State and Zip Code) 29111 Milford Rd., New Hudson, Michigan 48165	
	CHEMICAL FAMILY Copper Cyanide Additive	Proprietary ·

SECTION II – HAZARDOUS INGREDIENTS		%	TLV (Units)
Thallium Compounds	AGENTA MATTER TO A STATE OF THE	0.32	
Water Base	ANT TEXASSORE THE PROPERTY OF		
Poisonous by ingestion			
			·

#### SECTION III - PHYSICAL DATA

BOILING POINT ( PFI ( C)	1	SPECIFIC GRAVITY (H <sub>2</sub> O=1)			1		
	≯ 212°		1.01				
VAPOR PRESSURE (mm Hg)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A				
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE ( =1)	N/A				
SOLUBILITY IN WATER		pH=					
Complete							
APPEARANCE AND ODOR		The second secon	·	The second section of the second section of the second section	4		
Light yell	Light yellow liquid - no odor						

### SECTION IV - FIRE AND EXPLOSION HAZARD DAFA

FLASH POINT (method used)	FLAMMABLE LIMITS	LEL	. JUEL
Water solution - None			
ENTINGUISHING MEDIA	The state of the s		
Water or Foam			
SHECIAL FIRE FIGHTING PROCEDURES			
None			
UNUSUAL FIRE AND EXPLOSION HAZARDS			
None			
		The Market of the State of the	

SECTION V - HEALTH HAZ	ARDUAIA
EFFECTS OF OVEREXPOSURE  Chronic toxicity - ingestion - weakness	THRESHOLD LIMIT VALUE
and pain in extremities - loss of hair.	
Eye Contact: Immediately flush with water for 15 minutes — 5	See a physician
	See a Dillana
Skin Contact: Thoroughly wash with soap and water	
SECTION VI – REACTIVI	TY DATA
STABILITY UNSTABLE CONDITIONS TO AVOID STABLE X	
INCOMPATIBILITY (materials to avoid)	
Acids HAZARDOUS DECOMPOSITION PRODUCTS:	
Catastrophic fire may emit toxic fumes o	f Thallium
HAZARDOUS MAY OCCUR COND POLYMERIZATION WILL NOT OCCUR X	ITIONS TO AVOID
SECTION VII — SPILL OR LEAK STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	PROCEDURES
Flush with water	
WASTE DISPOSAL METHOD	
When used in copper cyanide plating bath	
conventional treatments. However, if de	sired #607 by itself can be ppt. by
small amounts of Potassium Iodide.	
SECTION VIII — SPECIAL PROTECT RESPIRATORY PROTECTION (specify type)	TON INFORMATION
Dust Mask	
VENTILATION LOCAL EXHAUST (Specify Rate)	SPECIAL.
MECHANICAL (general) (Specify Rate)  PROTECTIVE GLOVES Rubber X EYE	PROTECTION Goggles
Plastic	Face Shield X
Rubber Apron X Rubber Boots X	
SECTION IX – SPECIAL PRI	ECAUTIONS
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	ECAUTIONS
	s X Store away from direct heat X
Avoid skin or eye contact - wash thoroug	phly after handling.
OTHER PRECAUTIONS	
<u> </u>	
SECTION X – TRANSPORTA	ATION DATA
PROPER SHIPPING (Article) NAME	DOT CLASSIFICATION
Potassium Cyanide Solution	Poison
Poison Poison See Above	CAUTIONS AND PROCEDURES
DOT PLACARD PRECAUTIONS TO BE TAKEN IN TRANSPORTATION	N C
Poison See Above	
	ion and recommendations contained herein are reliable
damage or expense, direct or consequential, aris	f any kind and we assume no responsibility for any los. ing out of their use.

ALLIED-KELITE PRODUCTS DIVISION

NA = NOT APPLICABLE

### Witch MATERIAL SAFETY DATA SHEET

4 - EXTREME Heactivity FP 1 3 - HIGH 3 PRODUCT \_\_\_\_\_ Isobrite 607 2 - MODERATE - SLIGHT Toxicity 0 - INSIGNIFICANT Special SECTIONI WITCO MANUFACTURING DIVISION OR SUBSIDIARY EMERGENCY TELEPHONE MANUFACTURER ADDRESS (NUMBER, STREET, CITY, STATE, ZIP CODE) CHEM TREC 1-(800) 424-9300 CHEMICAL NAME OR FAMILY FORMULA Cyanide Copper Plating Solution Additive Proprietary SECTION II - CHEMICAL AND PHYSICAL PROPERTIES CHEMICAL PHYSICAL HAZARDOUS DECOMPOSITION PRODUCTS FORM l.iquid s None ODOB INCOMPATIBILITY (KEEP AWAY FROM) None APPEARANCE 6 None Clear LIST ALL TOXIC AND HAZARDOUS INGREDIENTS COLOR 11 Light yellow SPECIFIC GRAVITY 1.01 Thallium Carbonate - CAS 6533-73-9 12 WATER = 1) BOILING PT. > 100 SECTION III - FIRE AND EXPLOSION DATA ۰C SPECIAL FIRE FIGHTING PROCEDURES FLASH POINT (METHOD USED) > 212 ۵F 13 Water Solution MELTING PT. °C FLAMMABLE LIMITS % ٥٤ NΑ 14 27 LOWER \_\_\_\_\_UPPER \_ EXTINGUISHING AGENTS <u>None</u> SOLUBILITY UNUSUAL FIRE AND EXPLOSION HAZARDS IN WATER AT 20 °C ☐ DRYCHEMICAL 😾 CO. Complete 15 ▼ WATERSPRAY - ▼ FOAM % VOLATILE ☐ WATERFOG ☐ SAND/EARTH NA (BY WT %) 16 None COTHER. EVAP, RATE SECTION IV — HEALTH HAZARD DATA NA PERMISSIBLE CONCENTRATIONS (AIR) VAPOR PRESSURE NΑ 18 (mm Hg at 20°C) <sup>29</sup> OSHA STANDARD - air: TWA 0.1 mg/m<sup>3</sup> (as Thallium) VAPOR DENSITY EFFECTS OF OVEREXPOSURE NA (AIR = 1)8.0 30 Thallium Carbonate TXDS: oral-rat LDLO 23 mg/kg pH AS IS TOXICOLOGICAL PROPERTIES pH ( 20 Acute - nausea, vomiting, diahhrea, weakness, coma, death. Chronic - weakness and pain in extremities, loss of hair.

EMERGENCY FIRST AID PROCEDURES STRONG ACID STRONG BASE \_\_\_\_ Immediately flush with large amounts of water for STABLE \_\_ 15 minutes. Call a physician. UNSTABLE \_\_\_ 21 33 SKIN CONTACT Flush with large amounts of water for 15 minutes VISCOSITY < 100 □ SUS 100 OR > [] AT 100 °F 22 NDA 34 INHALATION Remove to fresh air. 23 35, IF SWALLOWED Call a physician.

NDA = NO DATA AVAILABLE

<= LESS THAN

HAZARD RATING

> = MORE THAN

PROTECTION V - SPECIAL PROTECTION INFORMATION
Local to maintain below the OSHA standard for Thallium.  38
SPECIAL ON VIII - TRANSPORTATION DATA
None  None  None  Rubber apron  Rubber gloves  SECTION VI—HANDLING OF SPILLS OR LEAKS  PROCEDURES FOR CLEAN-UP  Wear protective clothing and equipment during clean-up. Absorb with an inert material such as sand, earth or vermiculite; sweep up and dispose of in accordance with federal, state and local regulations.  41  WASTEDISPOSAL  By methods consistent with federal, state, and local regulations.  42  SECTION VII—SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKEN IN HANDLING AND STOCKED  Wear protective clothing and equipment while handling. Wash thoroughly after  43 handling.  SECTION VIII—TRANSPORTATION DATA  UNREGULATED  BY D.O.T.  POISON Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS  BY D.O.T.  REGULATED  BY D.O.T.  REGULATED  BY D.O.T. HAZARD CLASS  BY D.O.T. HAZARD CLASS  BY D.O.T. HAZARD CLASS  BY D.O.T. HAZARD CLASS  BY D.O.T. LIQUID REQUIRED  OTHER PROTECTIVE EQUIPMENT  Rubber apron  Rubber apron  Rubber gloves  Absorb with an inert  Rubber gloves  Absorb with an inert  material such as sand, earth or vermiculite; sweep up and dispose of in accordance with federal, state, and local regulations.  41  WASTEDISPOSAL  BY D.O.T. PROPER SHIPPING NAME  AND INTERCEPTION OF TRANSPORTATION DATA  BY D.O.T. PROPER SHIPPING NAME  AND INTERCEPTION OF TRANSPORTATION DATA  AND INTERCEPTION OF TRANSPORTATION DATA  BY D.O.T. PROPER SHIPPING NAME  AND INTERCEPTION OF TRANSPORTATION DATA  BY D.O.T. PROPER SHIPPING NAME  AND INTERCEPTION OF TRANSPORTATION DATA  BY D.O.T. PROPER SHIPPING NAME  BY D.O.T. PROPER SHIPPING NAME  AND INTERCEPTION DATA  BY D.O.T. PROPER SHIPPING NAME  BY D.O.T. PROPER SHIPPING
None    None   Rubber apron   Rubber apron   Rubber gloves
Rubber gloves
PROCEDURES FOR CLEAN-UP  Wear protective clothing and equipment during clean-up. Absorb with an inert material such as sand, earth or vermiculite; sweep up and dispose of in accordance with federal, state and local regulations.  41  WASTEDISPOSAL  By methods consistent with federal, state, and local regulations.  42  SECTION VII — SPECIAL PRECAUTIONS  PRECAUTIONS TO BETAKEN IN HANDLING AND STOTACH.  Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII — TRANSPORTATION DATA:  UNREGULATED DATA Poison Liquid NOS (Thallium Carbonate)  REGULATED VIS. D.O.T. HAZARD CLASS BY D.O.T. ABJORNO B.  POISON B. POISON B.  ILD. NUMBER  49 UN-2810
Wear protective clothing and equipment during clean-up. Absorb with an inert material such as sand, earth or vermiculite; sweep up and dispose of in accordance with federal, state and local regulations.  41]  WASTEDISPOSAL  By methods consistent with federal, state, and local regulations.  42]  SECTION VII — SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKENIN HANDLING AND STORAGE.  Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII — TRANSPORTATION DATA  U.S. D.O.T. PROPER SHIPPING NAME  UNREGULATED DATA POISON Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS BY D.O.T.  BY D.O.
Wear protective clothing and equipment during clean-up. Absorb with an inert material such as sand, earth or vermiculite; sweep up and dispose of in accordance with federal, state and local regulations.  41]  WASTEDISPOSAL  By methods consistent with federal, state, and local regulations.  42]  SECTION VII — SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKENIN HANDLING AND STORAGE.  Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII — TRANSPORTATION DATA  UNREGULATED DATA Poison Liquid NOS (Thallium Carbonate)  U.S. D.O.T. PROPER SHIPPING NAME  AT POISON Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS  BY D.O.T AB POISON B  AB UN-2810
material such as sand, earth or vermiculite; sweep up and dispose of in accordance with federal, state and local regulations.  41 WASTEDISPOSAL  By methods consistent with federal, state, and local regulations.  42 SECTION VII — SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE  Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII — TRANSPORTATION DATA  UNREGULATED U.S. D.O.T. PROPER SHIPPING NAME  BY D.O.T. VIII — TRANSPORTATION DATA  141  REGULATED VIII — Poison Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS  BY D.O.T. VIII — PROPER SHIPPING NAME  AB Poison B  145  146  POISON B  147  POISON B  148  POISON B  149  UN-2810
By methods consistent with federal, state, and local regulations.  SECTION VII—SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE.  Wear protective clothing and equipment while handling. Wash thoroughly after  handling.  SECTION VIII—TRANSPORTATION DATA:  UNREGULATED BY D.O.T. VIII—TRANSPORTATION DATA:  U.S. D.O.T. PROPER SHIPPING NAME  41 Poison Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS BY D.O.T. VIII—TRANSPORTATION DATA:  U.S. D.O.T. HAZARD CLASS BY D.O.T.
By methods consistent with federal, state, and local regulations.  SECTION VII — SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE.  Wear protective clothing and equipment while handling. Wash thoroughly after  handling.  SECTION VIII — TRANSPORTATION DATA:  UNREGULATED BY D.O.T. PROPER SHIPPING NAME  AT Poison Liquid NOS (Thallium Carbonate)  REGULATED U.S. D.O.T. HAZARD CLASS BY D.O.T. AB POISON B  LID. NUMBER  AB POISON B  UN-2810
SECTION VII — SPECIAL PRECAUTIONS  PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE.  Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII — TRANSPORTATION DATA  UNREGULATED U.S. D.O.T. PROPER SHIPPING NAME  BY D.O.T. 47 Poison Liquid NOS (Thallium Carbonate)  REGULATED U.S. D.O.T. HAZARD CLASS  BY D.O.T ABOUT THE POISON B  U.S. D.O.T. HAZARD CLASS  AB POISON B  ROUNT TRANSPORTATION DATA  1.D. NUMBER  49 UN-2810
Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII—TRANSPORTATION DATA  UNREGULATED BY D.O.T. Project Shipping NAME  43 Poison Liquid NOS (Thallium Carbonate)  REGULATED BY D.O.T. Project Shipping NAME  45 Poison B  48 Poison B  BO LLABELIST REQUIRED
Wear protective clothing and equipment while handling. Wash thoroughly after handling.  SECTION VIII — TRANSPORTATION DATA  UNREGULATED U.S. D.O.T. PROPER SHIPPING NAME  47 Poison Liquid NOS (Thallium Carbonate)  REGULATED U.S. D.O.T. HAZARD CLASS  48 Poison B  BO LIABELIST REQUIRED
handling.  SECTION VIII — TRANSPORTATION DATA  UNREGULATED BY D.O.T. Proper Shipping NAME  47 Poison Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS  BY D.O.T Proper Shipping NAME  47 Poison Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS  BY D.O.T Proper Shipping NAME  48 Poison B  BO LIABELIS) REQUIRED
SECTION VIII—TRANSPORTATION DATA  UNREGULATED BY D.O.T. Proper SHIPPING NAME  47 Poison Liquid NOS (Thallium Carbonate)  U.S. D.O.T. HAZARD CLASS  BY D.O.T X 48 Poison B  BO: LLABELIST REQUIRED
U.S. D.O.T. PROPER SHIPPING NAME  47 Poison Liquid NOS (Thallium Carbonate)  REGULATED BY D.O.T X 48 Poison B  BO LLABELIST REQUIRED
UNREGULATED BY D.O.T. Poison Liquid NOS (Thallium Carbonate)  REGULATED U.S. D.O.T. HAZARD CLASS BY D.O.T Poison B  ROULABELIST REQUIRED  ROULABELIST REQUIRED
REGULATED U.S. D.O.T. HAZARD CLASS  BY D.O.T AB POISON B  BO: LLABELIST REQUIRED
REGULATED ABY D.O.T AB POISON B AD UN-2810
48 1 0 1301 B
TRANSPORTATION RO LABEL(S) REQUIRED
TRANSPORTATION
EMERGENCY 50 NA 51 POISON INFORMATION FREIGHT CLASSIFICATION
70
SPECIAL TRANSPORTATION NOTES
1-(800) 424-9300 46 53 NA
SECTION IX - COMMENTS
Do not swallow. Avoid contact with clothing. Wash thoroughly after handling.
Wash clothing before reuse. Keep from feed and food products. Keep out of reach
of children. Keep container tightly closed when not in use.
SIGNATURE C.V. WILKIE TITLE Sr. Dev. Chem.
REVISION DATE DATE
SUPERSEDES

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

### MATERIAL SAFETY DATA SHEET

#### SECTION I

PHODUCT NAME OR NUMBER Isobrite #622	EMERGENCY TELEPHONE NO.  Day — (313) 437-8161
MANUFACTURER'S NAME ALLIED-KELITE Products, Division of the Richardson Co.	Nite - (313) 644-5626
ADDRESS (Number, Street, City, State and Zip Code) 29111 Milford Rd., New Hudson, Michigan 48165	
CHEMICAL FAMILY Cyanide Copper Brightener	FORMULA Proprietary

SECTION II – HAZARDOUS INGREDIENTS		%	TLV (Units)
Selenium Compounds		0.1	
Cyanide Compounds		0.1	
Water Base	AND CO. 10 CO. 1		
			AND CONTRACTOR OF THE PARTY OF
Selenium and cyanide are both considered highly toxic.			
	0.700		

#### SECTION III - PHYSICAL DATA

BOILING POINT ( X F) ( C	)	SPECIFIC GRAVITY (H2O=1)			,	
	212°		1.001			
VAPOR PRESSURE (mm Hg)	N/A	PERCENT VOLATILÉ BY VOLUME (%)	N/A	A THE STATE OF THE		
VAPOR DENSITY (AIR-1)	N/A	EVAPORATION RATE ( =1)	N/A	WINDOWS WINDOWS		
SOLUBILITY IN WATER		pH=				
Complete						
APPEARANCE AND ODOR	· · · · · · · · · · · · · · · · · · ·	S				
Clear white -	no odor					

#### SECTION IV - FIRE AND EXPLOSION HAZARD DATA

_		_	
FLASH POINT (method used)	FLAMMABLE LIMITS	LEL	UEL
Water solution			
EXTINGUISHING MEDIA	**************************************	<del>, , , , , , , , , , , , , , , , , , , </del>	
Water or Foam			
SPECIAL FIRE FIGHTING PROCEDURES			
None			
			· · · · · · · · · · · · · · · · · · ·
UNUSUAL FIRE AND EXPLOSION HAZARDS			··· ^
None	•		
4.4			

######################################	2111	SEC	TION V - HEALT	HAZA	RUDATA		ě
EFFECTS OF OVERE Swelling		, vomitin	g, nephritis and		THRESHOLD L	IMIT VALUE	i
gastro-i	ntestiona	al disord	lers.	7,0			
EMERGENCY AND F	IRST AID PRO	CEDURES		*	, , , , , , , , , , , , , , , , , , ,		······································
Eye Contact:	Immediatel	y flush wit	th water for 15 minu	tes – See	a physician	hedda a san a san an i garan a	<del>dinado de la comp</del> ne
Skin Contact:	Thoroughl	y wash wit	th soap and water		STATE STATE OF THE	1440 a mente e consecuent de la consecuent	(A) The grinning (A) Shipmen (
gl-min-rum room - rook-rum marinimum room - rumbibilitamanamanamasasasas	in the Contract of the Contrac		ECTION VI - REA	CTIVITY	'DATA		
STABILITY	UNSTA		CONDITIONS TO	DIOVA			
INCOMPATIBILITY (	materials to avo				antenne ammentatura marque esta esta esta esta esta esta esta est	and a state of the part of the	) ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
HAZARDOUS DECON			200 photos 100 200 m to 100 photos 100 photo	~ 4W0,			Occupantion of the Control of the Co
×	ı Cyanide	and Sele	nium in catastro	phic fi	re.		
HAZARDOUS POLYMERIZATION		MAY O		CONDITIO	ONS TO AVOID		
		SECTIO	N VII – SPILL OR	LEAK P	ROCEDURES	makamumumihonish da gifiji wagi bayaya mumayamimim mizi da da wa da gifiyaya baya muma wa mama da da da ga baya	
8			LEASED OR SPILLED	<u></u>			
Wash and	l tlush wi	th large	quantities of w	ater.			
*							
WASTE DISPOSAL MI		nido and	colonium if		-		New de Lor
W2 101 2	outum Cya	mide and	selenium - if r	equirea		·	·····
	W.m.s	ua-version reconstruction and the second					
	SE	CTION V	III – SPECIAL PRO	TECTIO	N INFORMATI	ON	ı
RESPIRATORY PROT					anna ann ann an ann ann ann ann ann ann	november and the same of the s	Ė.
Dust Mask	<u> </u>	None LOCAL EXI	HAUST (Specify Rate) Y			I SPECIAL	
V 2,111.12.1101	`		AL (general) (Specify Rate	•)		OTHER	
PROTECTIVE GLOVE	s Rubb Plasti			EYEPRO	OTECTION GO	ggles ce ShieldX	
отнея ряотестіле Rubber Apro		Dubbar Ba	ote Posiodic	dienoe	of closes		······································
nubbei Apio	// <u> </u>	MUDDEL DO	otsreriouic	uispus	ai oi gioves	if contaminated.	
	viiiii		TION IX - SPECIA	L PRECA	AUTIONS		
PRECAUTIONS TO BE Protect from			ate from reactive ma	terials 📝	Store awa	By from direct heat $2$	ζ
None, ex	cept do n	ot heat	to evaporate.				
OTHER PRECAUTION	NS			***************************************			
							· · · · · · · · · · · · · · · · · · ·
	<u> </u>	da		·			
	•	SECT	TION X - TRANSPO	ORTATI	ON DATA		
PROPER SHIPPING (A Potassiu	article) NAME m Cyanide	Solutio	n			Poison	<del></del>
OOT LABEL Poison	DOT MARKI Poison	NG	EMERGENCY ACCIDENT See Above	T PRECAU	TIONS AND PROCE	1	
DOTPLACARD	PRECA		BE TAKEN IN TRANSPOR	TATION	THE PERSON NAMED OF THE PE		.,
Poison	See	Above		· · · · · · · · · · · · · · · · · · ·			I
	) but a	re given wit		itee of any	y kind and we assi	ions contained herein ar ume no responsibility for	

ALLIED-KELITE PRODUCTS DIVISION

### MATERIAL SAFETY DATA SHEET

#### SECTION I

PRODUCT NAME OR NUMBER  ISObrite 630	EMERGENCY TELEPHONE NO. Day — (313) 437-8161
MANUFACTURER'S NAME ALLIED-KELITE Products, Division of the Richardson Co.	Nite - (313) 644-5626
ADDRESS (Number, Street, City, State and Zip Code) 29111 Milford Rd., New Hudson, Michigan 48165	
CHEMICAL FAMILY Complexing Agents	FORMULA Proprietary

SECTION II – HAZARDOUS INGREDIENTS		%	TLV (Units)
Rochelle Salts and Similar Chelants	Approx.	60	
EDTA Tetrasodium Salt	Approx.	2	
Water		Bal.	

#### SECTION III - PHYSICAL DATA

BOILING POINT ( X OF) ( C	)	SPECIFIC GRAVITY (H2O=1)			
	≯ 212°.		1.28		WATER STATE OF THE
VAPOR PRESSURE (mm Hg)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A		The state of the s
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE ( =1)	N/A		
SOLUBILITY IN WATER  Complete		рН=	12		Charles of the Charles
Brown, dark col	ored sol	utions - slight ammonical	odor	hamman garan kanada da karangan menenggan darah menggan pendah menggan pendah menggan pendah menggan pendah me	<u> </u>

#### SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used)	FLAMMABLE LIMITS	LEL   VEL
Non-flammable		
EXTINGUISHING MEDIA		The state of the s
Water or Foam		
SPECIAL FIRE FIGHTING PROCEDURES		
None		
UNUSUAL FIRE AND EXPLOSION HAZARDS		
None		

		SEC	CTION V - HEAL	TH HAZAI	RD DATA		4
EFFECTS OF OVERE Can be in		o skin or	r eyes.		THRESHOLD LI	MIT VALUE	<del></del>
	The state of the s	manyon angaran					
EMERGENCY AND F	IRST AID PRO	CEDURES		**************************************	animining-to-to-to-to-to-to-to-to-to-to-to-to-to-	A STATE OF THE STA	
			th water for 15 min	utes — See	a physician		-
Skin Contact:	Thorough	ly wash wi	th soap and water				
		S	SECTION VI - RE	ACTIVITY	/ DATA		
STABILITY	UNST		CONDITIONS	TO AVOID	the Control of the Co	) <sub>(Сре</sub> днят на почення в на при на	
INCOMPATIBILITY (	STAE		X		The second secon	and the street street, and the street street street, and the street street street, and the street street, and the street street, and the street street street street, and the street street street, and the street street street street, and the street street street street, and the street str	
Strong ox	cidizing	agents (	i.e. chromic ac	id)			
hazardous decon None	APOSITION PF	RODUCTS:					
HAZARDOUS		MAYO	CCUR	CONDITI	ONS TO AVOID		
POLYMERIZATION	·	WILL NO	roccua X			- victoria de la compansión de la compan	
	•	SECTIO	ON VII - SPILL O	R LEAK P	ROCEDURES		\ <u>'</u>
STEPS TO BE TAKEN	IN CASE MA		ELEASED OR SPILLED	11 00-007 114 7			
Flush wit	th water						
WASTE DISPOSAL MI	ЕТНОО				<del></del>		<del></del>
No specia	al proble	ms					
	<del></del>			· · · · · · · · · · · · · · · · · · ·	, , , , , , , , , , , , , , , , , , ,		
	<del>(                                     </del>	The second se	mana-andresamanananananananananananananananananana			gggggggggggggggggggggggggggggggggggggg	Dilling has been seen to be a seen of the
	S	ECTION V	/III - SPECIAL PR	OTECTIO	N INFORMATIO	ON	1
RESPIRATORY PROT	•	•		<u></u>			
Dust Mask		Non-vola	tile HAUST (Specify Rate)		<u> </u>	SPECIAL	
VENTILATION	N	Ł	CAL (general) (Specify R	ate)		OTHER	
PROTECTIVE GLOVE	s Rub	<u> </u>			OTECTION GOS	gles	
	Plast	ic	·		Fac	e Shield <u>X</u>	······································
Rubber Apro		Rubber Bo	oots X				
<u> سرخ د المحتمد و من المحتمد و من المحتمد و المحتم</u>	<u></u>	SEC	CTION IX - SPEC	AL PREC	AUTIONS		
PRECAUTIONS TO B		ANDLING A	ND STORING	Option of the second of the se		anne and an angle of the second se	92-0-103-2-102-102-102-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-103-1-
Protect from	freezing _	Iso	late from reactive n	naterials _	Store awa	y from direct heat 🔏	
Avoid sk	in or eye	contact					
OTHER PRECAUTION						The state of the s	
	<u>-</u>						
		<u> ئۆرىرى تەختىرى سىدىسى</u>	<del></del>	<del></del>	and the state of t		
		SEC	TION X - TRANS	PORTAT	ION DATA		
PROPER SHIPPING (A Compound	Article) NAME Cleaning			·····		Non-Hazardous	
DOT LABEL	DOTMARK		EMERGENCY ACCID	ENT PRECAL	JTIONS AND PROCE	DURES	
N/R DOT PLACARD	PAEC	AUTIONS TO	BE TAKEN IN TRANSPO	ORTATION			
N/R							4
A Company of the Comp	,					ions contained herein are	
्रों के किया है। के जिल्हा की किया कार्य की क्षेत्रकी है। के बीचिक की कार्य की किया की कार्य की कर की			thout warranty or gua ise, direct or consequer			ume no responsibility for	any loss,
		-					

ALLIED-KELITE PRODUCTS DIVISION

### MATERIAL SAFETY DATA SHEET

#### SECTION I

PRODUCT NAME OR NUMBER ISOBrite 631	EMERGENCY TELEPHONE NO.  Day — (313) 437-8161
MANUFACTURER'S NAME ALLIED-KELITE Products, Division of the Richardson Co.	Nite - (313) 644-5626
ADDRESS (Number, Street, City, State and Zip Code) 29111 Milford Rd., New Hudson, Michigan 48165	
CHEMICAL FAMILY Complexing & mild reducing agents	FORMULA Proprietary

SECTION II — HAZARDOUS INGREDIENTS		%	TLV {Units}
Aldohexos	Approx.	60	
EDTA Tetrasodium Salt	Approx.	2	
Water		Bal.	
·. ·		000000000000000000000000000000000000000	
	The Control of the Co		
			- Control of Control o

#### SECTION III - PHYSICAL DATA

BOILING POINT ( X°F) ( °	°C)	SPECIFIC GRAVITY (H2O=1)		
	≥ 212°		1.12	į
VAPOR PRESSURE (mm Hg)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A	
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE ( =1)	N/A	
SOLUBILITY IN WATER		pH=		
Complete		And the state of t	11	Serrend
APPEARANCE AND ODOR		<u> </u>		· · · · · · · · · · · · · · · · · · ·

#### SECTION IV - FIRE AND EXPLOSION HAZARD DATA

The first of the f								
FLASH POINT (method used)	FLAMMABLE LIMITS	LEL   UEL						
Water solution								
EXTINGUISHING MEDIA		**************************************						
Water or Foam								
SPECIAL FIRE FIGHTING PROCEDURES								
None								
JNUSUAL FIRE AND EXPLOSION HAZARDS								
None								
	5							

#### SECTION V - HEALTH HAZARD DATA

	256	JION V - HEALIH	HAZAKU DATA		1			
4		ritant.			americani de la compositiva della compositiva de			
		Y/O	and the second s	nverind-knowned-hannessensengestyren <sub>er</sub> -be/-bidsensessensengtroper/2011/doisid-tessy/274/dd-sessensensensen <sub>se</sub> gge	a-to-Cate for dear from the second			
EMERGENCY AND FIRST	AID PROCEDURES		, ————————————————————————————————————		<u> </u>			
		th water for 15 minute	es — See a physicia	n				
Skin Contact: Th	STABLE X  STONG OXIGANTS  STONG OXIGANTS  AZARDOUS DECOMPOSITION PRODUCTS:  NONE  AZARDOUS DECOMPOSITION PRODUCTS:  NONE  AZARDOUS DECOMPOSITION PRODUCTS:  NONE  AZARDOUS DECOMPOSITION PRODUCTS:  WILL NOT OCCUR X  SECTION VII — SPILL OR LEAK PROCEDURES  TEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED  Flush with water  \$  ASTE DISPOSAL METHOD  Neutralize and dispose  SECTION VIII — SPECIAL PROTECTION INFORMATION  ESPIHATORY PROTECTION (Specify Wes)  Dust Mask — None  VENTILATION   LOCAL EXHAUST (Specify Rate)   SPECIAL    NOTECTIVE GLOVES   Rubber X — Rubber X — Protective Goggles — Pace Shield X — Pace Shield X — Pace Shield X — Pace Shield X — Protective Equipment Rubber Apron X Rubber Boots X — SECTION IX — SPECIAL PRECAUTIONS  RECAUTIONS TO BE TAKEN IN HANDLING AND STORING Protect from freezing — Isolate from reactive materials — Store away from direct heat X — Avoid skin and eye contact  THER PRECAUTIONS  SECTION X — TRANSPORTATION DATA  ROPER SHIPPING (Articla) NAME							
	S	ECTION VI - REAC	TIVITY DATA	The second secon	egatik-acatap ektoreen 1925 somanter varamenet enuasse gevus musek			
STABILITY			AVOID					
INCOMPATIBILITY (mater		X	######################################					
i	-1							
		на при	enement of the second s	тиминими и положения (предуствення в предоставления на предоставления на предоставления (предоставления) (пред Предоставления на предоставления (предоставления на предоставления на предоставления (предоставления) (предост	·			
None		**************************************	·					
HAZARDOUS POLYMERIZATION	<u></u>		CONDITIONS TO AVO	ID				
	881 ( 140		}-	######################################				
	SECTIO	N VII - SPILL OR I	EAK PROCEDUR	RES				
STEPS TO BE TAKEN IN C	ASE MATERIAL IS R	ELEASED OR SPILLED	oonstamming (Constant <del>a Lead on the Selection of the Constant Constant on Constant on Cons</del> tant on Constant on Cons	en e				
Flush with wa	iter	<u> </u>	3-10		······			
· ·								
WASTE DISPOSAL METHO	)D				Hiteriot-missaussaussaussaussaussaussaussaussaussa			
Neutralize an	nd dispose							
				Texasis and the second				
·								
	SECTION V	'III – SPECIAL PROT	ECTION INFORM	MATION	(			
1		ranner (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987) (1987)	-		and the second s			
		HAUST (Specify Rate) V		J SPECIAL				
· EXTENTION	1	λ						
PROTECTIVE GLOVES	Rubber X		EYE PROTECTION	Goggles				
				Face Shield X				
		oots _X						
	<del>*************************************</del>				Ministration of the second			
			PRECAUTIONS					
I			erials Stor	e away from direct hea	+ Y			
13010511101111110	21119 130	rate if officeactive final	errars Stor	e away from unfect fiea	·			
Avoid skin an	nd eye contact							
OTHER PRECAUTIONS								
		(Challengely))))—————————————————————————————————			÷÷r÷ib-Thrisician var			
		TION X - TRANSPO	RTATION DATA					
		·			1			
N/R	LIMARKING	EWIENGENCY ACCIDENT	PRECAUTIONS AND F	-NOCEDURES .	match well to see the second			
DOTPLACARD	PRECAUTIONS TO	I BE TAKEN IN TRANSPORT	ATION					
N/R					<b></b>			
American Contract and American				nendations contained herei				
Significant Commence of the Co	but are given wit	hout warranty or guaran	tee of any kind and v	ve assume no responsibility	y for any loss,			
	uamage or expen	se, direct or consequential	, ansing out of their i	12g.				

ALLIED-KELITE PRODUCTS DIVISION

### U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

Form Approved OMB No. 44-R1387

Required under USDL Safety and Health Regulations for Ship Repairing,

Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)								
	100000 W.A.	SECT	ION I	**************************************				
MANUFACTURER'S NAME			EMERGENCY TELE					
OMI International Corporation			(313) 497-	9129				
ADDRESS (Number, Street, City, State, and ZIP Co 21441 Hoover Road, Warren, N	<i>de)</i> Aich	nigan 4	8089					
CHEMICAL NAME AND SYNONYMS Udvlite Nickel Brightener 31			TRADE NAME AND SYNONYM Same	S				
CHEMICAL FAMILY See below			FORMULA Proprietary	·				
SECTION	11 -	· · · · · · · · · · · · · · · · · · ·	RDOUS INGREDIEÑTS					
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATING	s %	TLV (Units)			
PIGMENTS	,Vo	No	BASE METAL	No	No			
CATALYST			ALLOYS					
VEHICLE			METALLIC COATINGS	7				
SOLVENTS		111111111111111111111111111111111111111	FILLER METAL PLUS COATING OR CORE FLUX					
TADDITIVES			OTHERS					
OTHERS								
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES								
A dry mixture containing Boric Acid and an aromatic								
sulfo-oxygen compound					NA			
					-			
		72						
SEC	TIO	N 111 - F	PHYSICAL DATA					
BOILING POINT (°F.)	Ū	nknown	SPECIFIC GRAVITY (H2 0=1)					
VAPOR PRESSURE (mm Hg.)		NA	PERCENT, VOLATILE BY VOLUME (%)		NA			
VAPOR DENSITY (AIR=1)		NA	EVAPORATION RATE		NA			
SOLUBILITY IN WATER	S	light			n			
APPEARANCE AND ODOR White Pov	vder				***************************************			
A P A W 1 A 2 1 1 2 7	p p p	P A B 1 P =	**************************************	5000 VIII VIII VIII VIII VIII VIII VIII				
	rik	EANUE	EXPLOSION HAZARD DATA	• • •	i la!			
FLASH POINT (Method used) None		··	FLAMMABLE LIMITS	Lei X	Ue!			
EXTINGUISHING MEDIA No specia	l re	quireme	ents					
SPECIAL FIRE FIGHTING PROCEDURES	Vone	e known						

UNUSUAL FIRE AND EXPLOSION HAZARDS None known

		nanoneen variabel en
	SECTION V - HEALTH HAZARD DATA	<b>8</b>
THRESHOLD LIMIT None know	vn or established	
EFFECTS OF OVERS	exposure skin, eyes, and respiratory system	
	•	STATE OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS N
	FIRST AID PROCEDURES	mittish-mentalaning and marginal marginal state of the st
Flush Skin	and eyes with clean, cool water	and the state of t
The state of the s		
		Kilinga Silika ayan ayan ayan ayan ay
	SECTION VI - REACTIVITY DATA	
STABILITY	UNSTABLE CONDITIONS TO AVOID	· ·
	STABLE X	
INCOMPATABILITY		
	DMPOSITION PRODUCTS	mane
	high temperatures oxides of sulfur and boron hydrides can form.  MAY OCCUR  CONDITIONS TO AVOID	
MAZARDOUS POLYMERIZATION		
	WILL NOT OCCUR X	
	SECTION VII - SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKE	en in case material is released or spilled do spilled do spill. Sweep up and return to container for re-use or disposal.	Flush
		1 10011
residue away	with water.	
WASTE DISPOSAL N		
	Use licensed waste disposal agent	
		9*************************************
		——————————————————————————————————————
	SECTION VIII - SPECIAL PROTECTION INFORMATION	the contract of the contract o
RESPIRATORY PRO	ofection (Specify type) d exposure, use mechanical dust respirator	<del></del>
VENTILATION	LOCAL EXHAUST Yes  No	<del>, , , , , , , , , , , , , , , , , , , </del>
-	MECHANICAL (General) NO OTHER NO	**************************************
PROTECTIVE GLOV	VES FYE PROTECTION	
OTHER PROTECTIV		
	SECTION IX - SPECIAL PRECAUTIONS	<u> </u>
	BE TAKEN IN HANULING AND STORING	NAME OF THE PARTY
AVOIG SKIN AN	nd eye contact. Wash thoroughly after handling	
OTHER PRECAUTIO	ONS	
		***************************************

#### U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

Form Approved OMB No. 44-R1387

# MATERIAL SAFETY

Required under USDL Safety and Health Regulations for Ship Repairing

•		•	(29 CFR 1915, 1916, 1917)				
	<del></del>	SECTI	ON I		minima (Primita Pipe		
MANUI ACTURER'S NAME EMERGENCY TELEPHONE NO.							
OMI International Corporation -		lite	(313) 497-91	29			
ADDRESS (Number, Street, City, State, and ZIP Co 21441 Hoover Road	ode)	Warren	, Michigan 48089	34344.000000000000000000000000000000000			
CHEMICAL NAME AND SYNONYMS Udylite Nickel Brightener 61	Adi	stor	TRADE NAME AND SYNONS	/MS		1	
CHEMICAL FAMILY (See Below)			FORMULA Proprietary	14337000000			
SECTION	J 11 -	HAZAR	DOUS INGREDIENTS			···	
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATII	vgs	%	TLV (Units)	
PIGMENTS	No	No_	BASE METAL		No	No_	
CATALYST			ALLOYS				
VEHICLE			METALLIC COATINGS				
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX				
ADDITIVES			OTHERS				
OTHERS							
HAZARDOUS MIXTURE	ES OF	OTHER LIC	DUIDS, SOLIDS, OR GASES		%	TLV (Units)	
An aqueous solution of unsatur	ated	sulfo-c	oxygen compounds, as	>	10	NA	
with a pH range of 5 to 6							
	,						
SE	СТІО	N III - F	PHYSICAL DATA				
BOILING POINT (°F.)	1/>	200°F	SPECIFIC GRAVITY (H2O=1)		1.19		
VAPOR PRESSURE (mm Hg.)	T <sub>N</sub>	IA	PERCENT, VOLATILE BY VOLUME (%)			lone	
VAPOR DENSITY (AIR=1)		IA	EVAPORATION RATE		T	JA	
SOLUBILITY IN WATER		precial				JA	
APPEARANCE AND ODOR Light Y			with an aromatic odor.			14.	
OF OT ION IN	r, r	T 4810	EVOLOCION HAZARD DATA		William Street		
	- rir	IC AND	EXPLOSION HAZARD DATA	Lei	T	Uel	
FLASH POINT (Method used) None			None			X	
	duct	does no	ot burn,				
SPECIAL FIRE FIGHTING PROCEDURES None			AND PARTY OF THE P				
UNUSUAL FIRE AND EXPLOSION HAZARDS None		<u> </u>					
		NOW_1/2					

ddiaecon 2000 Duggaran da 100 da 1	N-1-7 <sub>41112</sub> -24111		,	2	
	5	SECTION V	- HEA	LTH HAZARD D	IATA
THRESHOLD LIMIT		d .		All the second s	
None known o					
May cause irr	ltation.	and the state of t			. , , , , , , , , , , , , , , , , , , ,
EMERGENCY AND F	I DEST AID PONCED	111055			
			or eyes	get medical a	attention.
		_			
· · · · · · · · · · · · · · · · · · ·	^	SECTION	VI - F	EACTIVITY DA	TA
STABILITY	UNSTABLE	1	OITIONO	NS TO AVOID	
	STABLE	$T_{x}T$	<del></del>		
INCOMPATABILITY	(Materials to avoid)	·			
HAZARDOUS DECO	MPOSITION PROD	UCTS	oxidi		*
		Proba	<u>ble SO</u>	2 CONDITIONS TO	AVOID
HAZARDOUS	MAY OCCI	JR .		00110110113 737	
COT UNITALIAN	WILL NOT	OCCUR	X	į	
	2AVV911/100-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1				
	SEC	TION VII -	SPILL	OR LEAK PROC	EDURES
STEPS TO BE TAKE Flush with wa	N IN CASE MATER	RIAL IS RELE.	ASED OR	SPILLED	
riush With wa	ter.		<b></b>		
WASTE DISPOSAL A		accordan	ce Witl	n local statute	s:
<del>and the second the se</del>	<del>, , , , , , , , , , , , , , , , , , , </del>				The state of the s
annontal e en e	\$	· · · · · · · · · · · · · · · · · · ·	900000	·	
	SECTION	V VIII - SP	ECIAL	PROTECTION IN	IFORMATION
RESPIRATORY PRO	TECTION (Specify	type)		0 <del>- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - </del>	
	None				SPECIAL
VENTILATION	Yes			·	No
	MECHANICAL /	seneral)	· · · · · · · · · · · · · · · · · · ·		OTHER No
PROTECTIVE GLOV				EYE PROTECTION	safety goggles
OTHER PROTECTIV				Chemicars	salety goggles
	<u>Vone</u>	<del></del>	****		
1000 - 1000 1000 - 1000 1000 -		SECTION I	X - SP	ECIAL PRECAUT	TIONS
PRECAUTIONS TO	BE TAKEN IN HAI	NOLING AND	STORING		
Do not permit	<u>ambient ten</u>	nperature	to exc	eed 110°F or fa	all below 32°F
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		and the state of t	
OTHER PRECAUTION Avoid excess	ive skin con	tact. Wa	sh wit	h soap and war	ter after handling.

# MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbueaking (29 CFR 1915, 1916, 1917)

Shiphuilding,	and S	hipbreakin	g (29 CFR 1915, 1916, 1917)			
	ورزين والتخبيل وسوافة	SECT	ION I	.,		
MANUI ACTURER'S NAME	Anna Maria		EMFRGENCY TELEPHO	VE NO.	III pearend Nitzelinya (	bertalkanara <sup>†</sup> / <sub>ilipe</sub> a
OMI International Corporation	1 -	Udylite	(313) 497-912	29	<del>Zarrzikski narrii</del> nna	
ADORESS (Number, Street, Lity, State, and AIP Co 21441 Hoover Road	odej .	Warren,	Michigan 48089			
CHEMICAL NAME AND SYNONYMS Udylite Nickel Brighte			TRADE NAME AND SYNONYMS Same			
CHEMICAL FAMILY See Below			FORMULA Proprietary	<del></del>	***************************************	
		***************************************		· · · · · · · · · · · · · · · · · · ·		
SECTION	- 11	·	DOUS INGREDIENTS			
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%		LV nits)_
PIGMENTS	No	No	BASE METAL	No		la
CATALYST "			ALLOYS			
VEHICLE			METALLIC COATINGS			
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX			
ADDITIVES			OTHERS		-	
Unites				-		Ī
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES						
Aqueous mixture of aliphatic alcohols						
aliphatic sulfonates						Σ
salt of a polyhydroxy ac	id			5 5	N.	Α.
and other organic additi		3				
SEC .	CTIO	N III - F	PHYSICAL DATA	<del></del>	······································	
BOILING POINT (°F.)		212 F	SPECIFIC GRAVITY (H2 0=1)	1	1.1	5
VAPOR PRESSURE (mm Hg.)		NA	PERCENT, VOLATILE BY VOLUME (%)		NA	<del></del>
VAPOR DENSITY (AIR=3)		NA	EVAPORATION RATE		NA	· · · · · · · · · · · · · · · · · · ·
SOLUBILITY IN WATER	A ppi	reciable			X	
APPEARANCE AND ODOH Amber L	iqui	d				
SECTIONIV	FIF	RE AND F	EXPLOSION HAZARD DATA		*5*************************************	DT-LOCAL Track
FLASH POINT (Method used)	- 4 4 4 	·	FLAMMABLE LIMITS Lei		Üei	
EXTINGUISHING MEDIA N. A	<del></del>		X		X	
N.A.  SPECIAL FIRE FIGHTING PROCEDURES		<del></del>		· · · · · · · · · · · · · · · · · · ·		<del></del>
None k	now	'n				<b></b>
UNUSUAL FIRE AND EXPLOSION HAZARDS	<del> </del>	<del>.</del>		<del></del>		<del></del>
Prolong heating at extremely	hig	h tempe	ratures could liberate toxic oxi	<u>des c</u>	of	
sulfur.						

and the second s		ana and an			ohn-64-70-70-70-70-70-70-70-70-70-70-70-70-70-		and the passing Association and	
			2.0	V -	HEAL	TH HAZ	ARD [	DATA //
None Known Skin Irritation	X24.56	stablishe	d		- yangan da angan da	amadriu v a Virt siZiriii	e de deserviciones de la constante de la const	
Flush skin a	insi A ind e	iq PROCEDU yes with	water.	8	or eye	s, get	medio	cal attention.
				#107700		104 projecti (14 (15 ) - 17 (1 <sub>2</sub> property (14 (15 ) ) - 17 (14 property (14 (15 ) ) ) - 17 (14 property (15 ) ) - 17 (14		
			PECTIO	\A! \A	e or	ACTIVI	rv n a	
			3EC 110		-			LIM
STABILITY	UMST	ABLE		CO	ADITION	S TO AVOI	<u> </u>	
	STAB		_X					
INCOMPATABILITY	Materi	uls to avoid)	None	Kno	own			
HAZARDOUS DECO	MPOSIT	TON PRODUC	Ts None	Knc	nwo	3,100		9
NAZARDOUS		MAY OCCUR		1	, muon moun <sub>e</sub>	CONDITIO	NS TO	AVOID
POLYMERIZATION	-	WILL NOT O	CCUR		Х			
	<u> </u>	<u>,,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>					· .	
		SECT	ION VII	- 5	SPILL (	OR LEAR	PRO	CEDURES
STEPS TO BE TAKE. Flush are				EAS	ED OR S	PILLED		
Photographic in the second sec							——————————————————————————————————————	
WASTE DISPOSAL N		o ensed dis	ingsal		nt.		antinop <sub>ero</sub> .	
	·	<u> </u>						
				-				
	· · · · · · · · · · · · · · · · · · ·							
				SPE(	CIALP	ROTECT	ION	NFORMATION
RESPIRATORY PRO	TECTI	ON (Specify 1)	pc) No	ne		WP-		
VENTILATION	Loca	AL EXHAUST	Ye		· · · · · · · · · · · · · · · · · · ·			SPECIAL NO
•	MEC	HANICAL /Gr	****					OTHER NO
PROTECTIVE GLOV Rubbe	r Glo	oves				EYE PAC	TECTIO	
OTHER PROTECTIV		The second secon	111				,	
		S	ECTION	I IX	· SPE	CIAL PR	ECAU	TIONS
PRECAUTIONS TO Avoid Conta	BE TAN	KEN IN HAND Wash tho	LING AN	p st y a	oring fter ha	andling	Sto	re upright at temperature

between 32 F to 110 F.
OTHER PRECAUTIONS
For Industrial Use Only.

PAGE (2)

Form OSHA-29 Rev. May 72 U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Poim Approved OMB No. 44-R1387

## MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

	z rozsým na zavypum	SECT	ION I	teri nyivatana arang arang manana arang kanana nyang arang arang meninggan dan	imiljet i iniliai kasulii Katan kajimuse võpuuseseses val apunkyi	krebbiazanskih nem	<u>Седисков</u> ју <u>нич</u> ениј
MANUFACTURER'S NAME				EMERGENCY		).	
Formax Mfg. Corp.				313-921-	7030		
ADDRESS (Number, Street, City, State, and ZIP Co 3178 Bellevue Avenue, Detroit	nie) : , MI	4820	7				
CHEMICAL NAME AND SYNONYMS Animal Fatty Acid O/W Emulsic				AME AND SYNO Polishing C			
CHEMICAL FAMILY Organic			FORMULE 12	sa Ligo	& Comp	) W 4	<i>ID</i>
SECTION	<b>JII</b> .	HAZAF	DOUS INGHED				
PAINTS, PRESERVATIVES, & SOLVENTS	*	TLV	ALLOYS AND	metallic coa'	TINGS 1		TLV Joseph
PIGMENTS			BASE METAL				p of the
CATALYST			ALLOYS			A CONTRACTOR OF THE PARTY OF TH	-
VEHICLE NONE			METALLIC COATIO	108	- 100 E		
SOLVENTS CONTRACTO			FILLER METAL PLUS COATING OR	COREFLUX	NT 2 THE NO.		paramino (120) parami
ADDITIVES CONTE			OTHERS		M. s.		Proceduration of the Processing Processing
OTHERS good				The state of the s	<del></del>		
HAZARDOUS MIXTURE	SOF	OTHER LI	Duide, Bolide, or 1	ASES		K (1	TLV Unital
		•					
***************************************				<del>,</del>			
				Martin and a second section of the section of the second section of the section of the second section of the s			
	~ <b>T</b> !/	A)	HYSICAL DATA	1	Allen and the second	etimingelisteri ensem	-110 in
BOILING POINT (°F.)		212 <sup>0</sup> F	SPECIFIC GRAVIT			1.	<b>)</b>
VAPOR PRESSURE (inm Hg.)		gabeter de	PERCENT, VOLATI	~		0	****
VAPOR DENSITY (AIR-1)	_		EVAPORATION RA			H2	) A
SOLUBILITY IN WATER		nulsifi		<u> </u>		El &	
APPEARANCE AND ODOR Beige to						o Population management	
	Marinin in periodo de la composición del composición de la composición dela composición del composición de la composición del composició					ng Superior Superior	
	FIR	e and i	Explosion na	The state of the s			TOTAL PORT OF THE PERSON NAMED IN COLUMN
FLASH POINT (Method used) 265°F C	COC			IMITS			
EXTINGUISHING MEDIA Water; dry o	chemi	cal; Co	o; oil fire f	oams		o e e e e e e e e e e e e e e e e e e e	
SPECIAL FIRE FIGHTING PROCEDURES Does not cor	stit	ute a	fire or explos	ive hazard	ade anno senso en esta	<del>Фунотъунаа</del>	
		- Company of the comp				and the same of	,
UNUSUAL FIRE AND EXPLOSION HAZARDS	NC	ONE		-			
*	раничерую подпасня по	<u> </u>	Marine Commission of the Commi				

		SEC	CTION	V -	HEAL	TH HAZARO [	DATA	
EFFECTS OF OVEREXPOSURE		UNKNO	WN	J		ALEXANDER OF THE PROPERTY OF T		
		NONE	No. And the Control of the Control o	-24-P-(N-0), and		anternity beauty of physical general property and attended to the first control of the first		į
MERGENCY AND	FIRST ALL	D PROCEDUR	RES	NON	E REQU	JIRED		
grygoriogicionen anno anno anno agricogo de la companio de la companio de la companio de la companio de la comp		and the state of t	gergagna - Agent - Age	acamatan space	one of the second secon			
			SECTIO	N V	/I - R!	ACTIVITY DA	TA '	
TABILITY	UNSTA	BLE		cov	MOITION	S TO AVOID		
	STABL		Х		пои	TE		Summers
NCOMPATABILIT'					NON	VE ·		
HAZARDOUS DEC	OMPOSITI	ON PRODUC	TS		МОИ	Œ.		- Ilonary
UW TWOOD		MAY OCCUR		CONDITIONS TO AVOID			AVOID	
POLYMERIZATION		WILL NOT O	ССОН		X	NONE		
		SE MATERIA	AL IS REL	LEAS	ED OR S			410
Wipe c	or scoo	P up. Di	AL IS REL	LEAS	ED OR S			
Wipe o	or scoo	P up. Di	AL IS REL	LEAS	ED OR S	PILLED		
Wipe c	or scoo	SE MATERIA	AL IS REL	LEAS	ED OR S	PILLED		
Wipe c	METHOD	SE MATERIA	ispose	of	ED OR S	solid waste o		
Wipe o	Or SCOO	P UP. Di	ispose  VIII - S	of SPEC	ED OR S	solid waste o	or incinerate	
Wipe o	METHUD	P UP. Di	ispose  VIII - S	of	ED OR S	solid waste o	or incinerate	
Wipe o	METHOD	DECTION	ispose  VIII - S  Pr/ NC	of SPEC	ED OR S	solid waste o	NFORMATION	
Wipe C	METHOD  STOTECTION  LOCAL  MECH	SECTION V	VIII - S	of SPEC	ED OR S	ROTECTION II	NFORMATION  SPECIAL NONE OTHER	
Wipe C	EDCAL MECH. DVES	SECTION N (Specify ty) EXHAUST ANICAL (Gen	VIII - S	of SPEC ONE	ED OR S	ROTECTION II	NFORMATION  SPECIAL NONE OTHER	
Wipe C	EDCAL MECH. DVES	SECTION N (Specify Ty) EXHAUST ANICAL (Gen erator pr	ispose  VIII - S  Pr/ NO  X  referer  NONE RE	of SPEC ONE	CIAL P	ROTECTION II	NFORMATION  SPECIAL NONE OTHER  Nylasses - contains abrasiv	
Wipe C	METHOD  STOTECTION  LOCAL  MECH.  OVES.  Op	SECTION V N (Specify ty) EXHAUST ANICAL (Gen erator pr	VIII - S Pel NO X referer NONE RE	of SPEC ONE	CIAL P	ROTECTION II	NFORMATION  SPECIAL NONE OTHER  NUMBER  OTHER  NUMBER  OTHER  NUMBER  OTHER  NUMBER  N	
Wipe of Waste Disposal Disposa	METHOD  STOTECTION  LOCAL  MECH.  OVES  OPE TAKE	SECTION Y N (Specify ty) EXHAUST ANICAL (Gen erator proment to	VIII - S  Pel NO  X  referer  NONE RE	of SPEC ONE Ce EQUI	CIAL P	ROTECTION II  EVE PROTECTION Safety  CIAL PRECAU	NFORMATION  SPECIAL NONE OTHER  Nylasses - contains abrasiv	

# U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

Form Approved OMB No. 44-R1387

# MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

	SECT	ION I		
MANUFACTURER'S NAME			EMERGENCY TELEPHO	ONE NO.
DELROD SALES CORPORATION			616-327-6722	
ADDRESS (Number, Street, City, State, and ZIP Code) 2485 Zylman Road, Kalamazoo,	Michiga	an 49002		(Piller-formungsport) and description of the second of
CHEMICAL NAME AND SYNONYMS  Na		TBAPE Y	AME AND SYNONYMS 3368 Compound	All the state of t
CHEMICAL FAMILY Duffing compound		FORMULA proprietary	All resources and the state of	
	THE PROPERTY OF THE PARTY OF TH	Commence of the Commence of th		

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS	A Contraction of the Contraction		BASE METAL		A A A STOCK AND A
CATALYST	-		ALLOYS		
VEHICLE	-	The Property of the Property o	METALLIC COATINGS		
SOLVENTS		j.	FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS	- Company	
OTHERS		**			
HAZARDOUS MIXTURES	of	OTHER LI	DUIDS, SOLIDS, OR GASES	*	TLV (Unite)
					Conditions arranged in the Conditions of the Con
	·	Maryland Wall de Landschaff Const.			

SEC	TION III - P	HYSICAL DATA	
BOILING POINT (°F.) approximately	220	SPECIFIC GRAVITY (H2O=1)	1.02
VAFOR PRESSURE (mm Hs.) less than	15	PERCENT, VOLATILE BY VOLUME (%)	0
VAPOR DENSITY (AIR=1)	na	evaporation rate ( <u>ether</u> =1) greater than	1
SOLUBILITY IN WATER	complete	На	9.5
APPEARANCE AND ODOR clear soluti	on, mild	pleasant odor.	

	ECTION IV - FII	RE AND EXI	PLOSION H	AZARD DAT	A	
FLASH POINT (Method used)	na	70	FLAMMABLE	ELIMITS	Linkhown	unknown-
EXTINGUISHING MEDIA	A State-market framework as recognized to the state of th	COLUMN CO	and the state of the	- Comments of the Comments of		
SPECIAL FIRE FIGHTING PR	CEDURES Should	d not bur	n in as	it or use	condition	· ·
UNUSUAL FIRE AND EXPLO	SION HAZARDS 11	one are k	nown.			

	\$ <b>\$</b>	CTION	V - HEAL	TH HAZA	RD DATA		
THE SHOLD LIMIT	YALUE not det	ermine	d				
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Sir i la complè e para la complè de la comple de la compl	ve skin.						
	RST AID PROCEDU		+ 15 min	tes if i	n eves co	nsult physic	ian if
	ig, blushing	g. 65 - 1 - 1 - 1 - 1	garage and Alexander	***************************************			Semanticular, spacementalical NV, perspection of NVIII spacement.
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		SECTIO	NVIFE		/ DATA		
STASILITY	UNSTABLE		CONDITIONS	TO AVOID			
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MC PATABILITY	strong ox		and the state of t	- November scaling to the cale - also - to the control of the cale - also - to the cale - also -	om man side (To 1984 werker namer), and The World were man size of the Tolking	myselv Thrombolish in a last process of the second and the second and the second and the second and the second	manazagongi Shrivananan manaya di Fridhennoy manazagong Shrivan ay manaya di Albertan ay manazagong Shrivan ay
HAZ ARDOUS DECO	MPOSITION PRODUC	TS n	one are k	nown	7		
HAZARDOUS	MAY OCCUR			CONDITION	S TO AVOID		
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		~ 25 2 2 2	n				
STES TO SE TAKE	N IN CASE MATERIA				ROCEDURE		CONTRACT LEAVES TO THE PARTY OF
flush 1	into chemical	sewer	or absor	b onto s	<u>solid absor</u>	bents.	
WASTE DISPOSAL N	ZOHTO		erro antique que de <del>Sante de mais antique en cons</del> titue de la constitue de la	The second secon		and the state of t	MAL
	Il or inciner	<u>ate as</u>	<u>permitte</u>	ed by loc	al, state	and federal	statutes.
		terior services	and the second s	· · · · · · · · · · · · · · · · · · ·	and the second s		
nd language of the commence of the language of the language of the second production of the language of the la	SECTION!	VIII - S	PECIAL PE	ROTECTIC	N INFORMA	TION	
RESPIRATORY PRO	TECTION (Specify by	pe)			se conditio		
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OTHER PRECAUTIC	• • • • • • • • • • • • • • • • • • •						
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# U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

Form Approved OMB No. 44-R1387

# MATERIAL SAFETY DATA SHEET

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	hannegaHibpingaç	SECTI	IONI I	de <sup>comprom</sup> ericanio y	haippi Allahailamad III Arianani Willia
MANUFACTURER'S NAME	····		EMERGENCY TELEPHONE	NO.	
DELROD SALES CORPORATION			616-327-6722	· · '	
ADDRESS (Number, Street, City, State, and ZIP Co 2485 Zylman Road, Kalamaz	de)	Mich:	<del></del>	100 Tanasa	
CHEMICAL NAME AND SYNONYMS		A 5 A 45 No 6 a six	TRANE NAME AND SYNONYMS	ATTOMOS OF THE STATE OF	
CHEMICAL FAMILY			FORMULA DSC #255		No.
SECTION	11 -	- HAZAR	DOUS INGREDIENTS	700	gangaritation and the second s
PAINTS, PRESERVATIVES, & SOLVENTS	T*	TLV (Unital	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE	-		METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS 1	. initia	
OTHERS					
HAZARDOUS MIXTURES	5 OF	OTHER LIC	UIDS, SOLIDS, OR GASES	-%	(Units)
	-				
	Name of the last				
	417				
		**			
				and the second	
	TIU	NIII - r	HYSICAL DATA	· 3	
BOILING POINT (°F.)		NA	SPECIFIC GRAVITY (H2O=1)		
VAPOR PRESSURE (mm Hg.)	1_	NA	PERCENT, VOLATILE BY VOLUME (%)		NA
VAPOR DENSITY (AIR-1)	in the state of th	NA	EVAPORATION RATE (=1) -		NA
SOLUBILITY IN WATER	M	ODERATE			
AFPEARANCE AND ODOR Cream colo	rec	d powde	er, slight pine odor	and the Company of th	Octop professional profession (Contractive Contractive
SECTION IV -	FIF	E AND F	EXPLOSION HAZARD DATA		anny AVII de a de Promonte De Calebra
FLASH POINT (Mathod Used)	manage Definism	nang <sup>iri</sup> mengasaa Perlemakina Perlema	FLAMMABLE LIMITS Let	1	Uel
EXTINGUISHING MEDIA NA		En agerilleure) y breason da A <sup>NDA MAN</sup> O'y y breeze gil' (122 discultus 	NA	1	
SPECIAL PIRE FIGHTING PROCEDURES NA	***************************************				Annual Commence of the Commenc
region for the second s	and the				e de la companya del companya de la companya del companya de la co
UNUSUAL FIRE AND EXPLOSION HAZARDS	NT.	4		***	
	. NA	Marin	Name of the Control o	-	

	SE	CTION V -	HEALTH	HAZARD	DATA				
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EFFECTS OF OVER						diameter de la constitución de l			
						<del></del>			
EMERGENCY AND	FIRST AID PROCEDUR	ES th ple	ntv of	water.		***************************************	***************************************		
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		SECTION VI		·	ATA				
STABILITY	UNSTABLE	CON	DITIONS TO	AVOID	whithe attention was		······································	and Market and Appropriate	
ALCORDO VARAL	STABLE  Y [Materials to avoid]	X	\$2-10-10-10-10-10-10-10-10-10-10-10-10-10-		and the state of t	<del>Ferrian de la comp</del> ensa de la compensa de la compe	- Prompt Supple	Market or the species of	
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HAZARDOUS POLYMERIZATION	MAY OCCUR			NUTTIONS T	U MVUIU	-	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	a. ac+likkim marana/Válladay	
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Sweep	EN IN CASE MATERIA UP SO AS TO	L IS RELEASE MI TIMUM	o on spilli airbort	ED Ne dust			tions.		
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Form OSHA-2(

#### U.S. DEPARTMENT OF LABOR

# WAGE AND LABOR STANDARDS ADMINISTRATION Bureau of Labor Standards

### MATERIAL SAFETY DATA SHEET

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		SECT	- Andrew Strategies and Strategies a		
MANUFACTURER'S NAME MACDERMID, INC.			EMERGENCY TELEPH 203-754-6161	ONE NO,	
ADDRESS (Number, Street, City, State, and ZIP Code 526 HUNTINGDON AVENUE, WATERBUR		<b>ハ</b> ιΝ( <b>こ</b> ので)の	IT 05720		
CHEMICAL NAME AND SYNCHYMS	1,00	1810-61361	TRADE NAME AND SYNONYMS Metex S-486		***************************************
CHEMICAL FAMILY			FORMULA :	T	Charles de la company de la co
Soak Gleaner	<del>Vi-lettattatatata</del>			,	<del></del>
SECTIO	NH	HAZARI	OOUS INGREDIENTS	+ COMMENTAL STATE OF THE STATE	Alexandra Vandaria
PAINTS, PRESERVATIVES, & SOLVENTS	1 %	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			SASE METAL		
CATALYST			ALLOYS		
VEHICLE	1		METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS				İ	
· HAZARDOUS MIXT	URES	OF OTHER	LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
					(Omta)
	**************************************	<del></del>			
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BOILING POINT (*F.)		1	SPECIFIC GRAVITY (H20=1)		
VAPOR PRESSURE (mm Hg.)	1		PERCENT VOLATILE BY VOLUME (%)		
VAPOR DENSITY (AIR=1)			EVAPORATION RATE ( =1)		
SOLUBILITY IN WATER	Co	molete			
APPEARANCE AND ODOR Light tan					
	,				·
SECTION IV	FIRE	AND EX	(PLOSION HAZARD DATA	**************************************	
FLASH POINT (Method used) None			FLAMMABLE LIMITS	el	Uel .
EXTINGUISHING MEDIA .	-01-114-Y-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	78.4. O 4.5. · · · · · · ·			
SPECIAL FIRE FIGHTING PROCEDURES					
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UNUSUAL FIRE AND EXPLOSION HAZARDS			The second secon		····

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		SECT			CTIVITY DATA
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	STABLE	l x			
INCOMPATABILITY	(Materials to avoid)	1 45		·	
HAZARDOUS DECON	APOSITION PRODUC	CTS		<del></del>	
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					LEAK PROCEDURES
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PESPIRATORY PROT VENTILATION	SECTI TECTION (Specify ty LOCAL EXHAU MECHANICAL	ON VIII	SPECIAI	L PR(	OTECTION INFORMATION
PESPIRATORY PROTECTIVE GLOVE	SECTI TECTION (Specify ty LOCAL EXHAU MECHANICAL I	ON VIII	SPECIAI	L PR(	OTECTION INFORMATION  SPECIAL  OTHER  EYE PROTECTION
PESFIRATORY PROTEINT OF THE PROTECTIVE GLOVE	SECTI TECTION (Specify ty LOCAL EXHAU MECHANICAL I	ON VIII	SPECIAI	L PR(	DTECTION INFORMATION    SPECIAL   OTHER
PESPIRATORY PROT VENTILATION	SECTI TECTION (Specify ty LOCAL EXHAU MECHANICAL I	ON VIII	SPECIAI	L PR(	OTECTION INFORMATION  SPECIAL  OTHER  EYE PROTECTION
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PESPIRATORY PROTECTIVE GLOVE	SECTI FECTION (Specify ty LOCAL EXHAU MECHANICAL I	ON VIII (pe) (ST (General)	SPECIAI  Dust	L PR(	SPECIAL OTHER EYE PROTECTION Goggles
PESPIRATORY PRO- VENTILATION . PROTECTIVE GLOVE OTHER PROTECTIVE	SECTI FECTION (Specify ty LOCAL EXHAU MECHANICAL I	ON VIII (pe) (ST (General)	SPECIAI  Dust	L PR(	SPECIAL OTHER EYE PROTECTION Goggles

#### U. S. DEPARTMENT OF LABOR

#### WAGE AND LABOR STANDARDS ADMINISTRATION

Bureau of Labor Standards

#### MATERIAL SAFETY DATA SHEET

	en-rence-ur-suc			12277		
		SECT	IONI			
MANUFACTURER'S NAME				EMERGENCY TELEPHO	YE NO.	*
MACDERMID, INC.		······································		203-754-6161	·	
ADDRESS (Number, Street, City, State, and ZIP Code 526 HUNTINGDON AVENUE, WATERBUF		NNECTIC	11T 06720			
CHEMICAL NAME AND SYNONYMS	1,1	1414 5 12 1 1.	TRADENA	ME AND SYNONYMS		
CHEMICAL FAMILY	7		Mete:	c P = 1777		- ···
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PIGMENTS ···			BASE METAL		1	
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### U. S. DEPARTMENT OF LABOR

#### WAGE AND LABOR STANDARDS ADMINISTRATION

Bureau of Labor Standards

#### MATERIAL SAFETY DATA SHEET

EMERGENCY TELEPHONE NO.

SECTION 1

MANUFACTURER'S NAME

Land to the second MACDERMID, INC. 203-754-6161 ADDRESS (Number, Street, City, State, and ZIP Code) 526 HUNTINGDON AVENUE, WATERBURY, CONNECTICUT 06720 CHEMICAL NAME AND SYNONYMS TRADE NAME AND SYNONYMS CHEMICAL FAMILY Electrocleaner FORMULA 80.00 SECTION II HAZARDOUS INGREDIENTS TLV (Units) TL<sub>i</sub>¥ : PAINTS, PRESERVATIVES, & SOLVENTS ALLOYS AND METALLIC COATINGS (Unixs) PIGMENTS BASE METAL CATALYST ALLOYS VEHICLE **METALLIC COATINGS** FILLER METAL PLUS COATING OR CORE FLUX SOLVENTS ADDITIVES OTHERS OTHERS TLV HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES Sodium Hydroxide SECTION III PHYSICAL DATA BOILING POINT ("F.) SPECIFIC GRAVITY (H20=1) PERCENT VOLATILE VAPORTRESSURE (mm Hg.) BY VOLUME (%) EVAPORATION RATE VAPOR DENSITY (AIR=1) "" SOCUBILITY IN WATER Complete APPEARANCE AND ODOR Off white granular mixture. SECTION IV FIRE AND EXPLOSION HAZARD DATA FLASH POINT (Method used) FLAMMABLE LIMITS Uel EXTINGUISHING MEDIA SPECIAL FIRE FIGHTING PROCEDURES UNUSUAL FIRE AND EXPLOSION HAZARDS

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·	UNSTABLE	* 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		2 (A) (B) (B) (B) (B) (B) (B)		
	STABLE			er should be made slowly and		
INCOMPATABILITY (			cably in cold	water. The reaction liberates		
HAZARDOUS DECOM	POSITION PRODUCTS	heat.				
HAZARDOUS .	MAY OCC	:UR .	- CONDITION	NS TO AVOID		
POLYMERIZATION	WILL NO	TOCCUR				
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		TION VII SPILL		OCEDURES		
STEPS TO BE TAKEN	IN CASE MATERIAL I	S RELEASED OR SP	As wit	h sodium hydroxide.		
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WASTE DISPOSAL ME	THOD Neutralia	e to pH betwo	en 6.0 to 8.	O with dilute acid prior to		
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discharging to sewer.						
SECTION VIII SPECIAL PROTECTION INFORMATION						
RESPIRATORY PROTECTION (Specify type)						
VENTILATION	LOCAL EXHAUST			SPECIAL		
Proposition	MECHANICAL (General)  OTHER		OTHER			
PROTECTIVE GLOVES Rubber EYE PROTECTION Goggles						
OTHER PROTECTIVE EQUIPMENT						
SECTION IX SPECIAL PRECAUTIONS						
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING  As with sodium hydroxide						
OTHER PRECAUTIONS						
	· ·	· · · · · · · · · · · · · · · · · · ·				

#### Alberta Carlos Barbara Comercia

Occupational Safety and Realth Administration

# MATERIAL SAFETY DATA SHEET

Required under USDL Salety and Health Regulations for Ship Repairing, Ship-building, and Ship-breaking (29 CFR 1915, 1916, 1917)

		SECT	TION I		
MANUFACTURER'S NAME			EMERGENCY TELEPHO	EMERGENCY TELEPHONE NO.	
BENCHMARK, INC.			313-285-0900/313-644-56		-5626
ACCRESS Number, Sucer, City, State, and ZIF C 4000 - 13th Street, Wysnic CHEMICAL NAME AND SYNONYMS	Tode) Jotte, I	Michig	an 48192 TABLE NAME AND SYNONYMS B-920		
CHEMICAL FAMILY			FORMULA		
SECTION	VII - H	HAZAF	RDOUS INGREDIENTS		
TAINTS, PRESLAVATIVES, & SOLVENTS	1 %	TLV (Units)	ALLOYS AND METÄLLIC COATINGS	4%	TLV (Units)
PIGRENTS	44400	_	BASE METAL	ļ	
CATALYST		,	ALLOY <b>S</b>		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES	***************************************		OTHERS	-	
OTHERS					
HAZAEDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR CASES					(دِيْرُيْرِيْ)
Caustic Soda					
Oliver of the second					
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SEC	TION II	II - Pi	HYSICAL DATA		
BOILING POINT (°F.)	1		SPECIFIC GRAVITY (H20=1)	1	
VAPOR PRESSURE (mm Hg.)	1		PERCENT, VOLATILE EY VOLUME (%)	<u></u>	
VAPOR DENSITY (AIR=1)			EVAPORATION RATE	No. of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of Contrast of	
SOLUBILITY IN WATER Approx:	150 g	3/1 ·			
White powder - alkali odor					• • • • • • • • • • • • • • • • • • • •
SECTION IV - I	FIRE A	ND E>	(PLOSION HAZARD DATA		]

<u></u>	<del></del>			
SECTION	IV - FIRE AND FX	PLOSION HAZARD DAT	Δ	
FLASH POINT (Method used)	N/A	FLAMMABLE LIMITS	Lel	Uel
<u></u>	14/11	<b>}</b>		
EXTINGUISHING MEDIA	*			
SPECIAL FIRE FIGHTING PROCEDURES				
				•
UNUSUAL FIRE AND EXPLOSION HAZAI	RDS	* * * a * - * * 4		
	None known			

AIS-OLD LD	The same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the sa	TECTION V A REALTH HAZAR	
HICTSOFON	CAEAROS URE		
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EVILLGENCY AN	D FIRST AID ; HOCED	URES	
- distribution of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the	Tre	et as caustic soda	
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• • • • • • • • • • • • • • • • • • •		SECTION VI - REACTIVITY	DATA
MARILITY	UNSTABLE	CONDITIONS TO AVOID	and a supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied of the supplied
	STABLE TY plantials to avoid)	x	*
	COMPOSITION FRODU	Acids	
######################################	MAY OLCU	None known	O AVOID
FOLYMENTIANSO	<b>\$</b>		
SV	veep up - flush s	alus Released on Spilled  aell amounts with water.  ate solids.	
·	SECTION	/III - SPECIAL PROTECTION I	NFORMATION
ELEMBATORY PA	OTECTION (Specify by		
MERTHATION	LOCAL EXHAUST	esel)	EFFCIAL OTHER
PROTECTIVE GLO	- Rubber	EYE PHOTECTIO	Safety Goggles
		CTION IX - SPECIAL PRECAU	TIONS
RECAUTIONS TO	BE TAKEN IN HANDL		110103
- Ke	ep dry.		

6PO \$24.110

PAGE (2)

#### MATERIAL SAFETY DATA SHEET CLEPO 569-N

AUGUST 1983 PAGE 1 OF 2 \*\*\*\*\* SECTION 01 IDENTIFICATION \*\*\*\*\*\*\*\*\*\*\*\*\*\*\* INFO FURNISHED BY..... FREDERICK GUMM CHEM CO. INC. 538 FOREST ST KEARNY NJ 07032 ADDRESS.
CHEMICAL NAME/SYNONYMS...
HAZARD CLASS.
CHEMICAL FAMILY...
EMERGENCY PHONE # 538 FOREST ST KEARNY NJ 0703: CLEPO 569-N CHEMICAL N.O.S ADDITIVE FOR NITRIC ACID 201-991-4174 OR 313-644-5626 FORMULA...... PROPRIETARY \*\*\*\*\*\* SECTION 02 PHYSICAL DATA \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* BOILING POINT(DEG F)....
VAPOR PRESSURE(mmHq)....
VAPOR DENSITY(AIR=1)....
SOLUBILITY IN WATER.....
SPECIFIC GRAVITY(H20=1)..
X VOLATILE BY VOLUME....
EVAPORATION RATE(H20=1).. >212 DEG F NΑ NA COMPLETE APPROX. 1.32 APPROX. 45% 1 APPEARANCE & ODOR...... DARK BROWN LIQUID \*\*\*\*\*\*\*\*\*\*\*\*\* SECTION 03 FIRE AND EXPLOSION DATA \*\*\*\*\*\*\*\*\*\*\*\*\* FLASH POINT..... NONE EXTINGUISHING MEDIA.... NA SPECIAL FIRE FIGHTING PROCEDURES NONE UNUSUAL FIRE AND EXPLOSION HAZARDS NONE NFFA HAZARD CLASSIFICATION.....HEALTH HAZARD(BLUE)
FLAMMABILITY(RED) 0 REACTIVITY (YELLOW) \*\*\*\*\*\* SECTION 04 REACTIVITY DATA \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* STABLE TO AVOID) WILL NOT OCCUR \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* SECTION OF HAZARDOUS COMPONENTS \*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PAINTS, PRESERVATIVES, & SOLV ALLOYS AND METALLIC COATINGS & SOLVENTS ... NOT APPLICABLE APPLICABLE NOT TLV(Mg/M3) HAZARDOUS COMPONENT % BY WEIGHT IRON SALTS AS Fe 3.5 \*\*\*\*\* SECTION 06 SPILL LEAK AND DISPOSAL PROCEDURES \*\*\*\*\*\*\*\*\*\*\*\*

SWEEP UP AND/OR FLUSH TO WASTE DISPOSAL AREA. WATCH FOR SLIPPERY CONDITIONS

WASTE DISPOSAL METHOD

NEUTRALIZE TO LOCALLY ACCEPTABLE ph. DEPENDING ON USAGE AND LOCALITY,
MAY ALSO REQUIRE PRECIPITATION OF HEAVY METALS. THEN DUMP TO DRAIN

STEPS\_TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

#### MATERIAL SAFETY DATA SHEET FOR CLEPO 569-N .... PAGE 2 OF 2

THRESHOLD LIMIT VALUE (CALCULATED) ..... 28.57 (Mg/M3)

FECTS OF OVEREXPOSURE CORROSIVE-WILL BURN SKIN AND EYES ... HARMFUL IF SWALLOWED

EMERGENCY AND FIRST AID PROCEDURES

REMOVE CONTAMINATED CLOTHING AND SHOES, FLUSH EFFECTED AREA WITH
PLENTY OF WATER (FOR EYES, HOLD EYELIDS OPEN AND FLUSH WITH WATER
FOR AT LEAST 15 MINUTES). IF SWALLOWED DO NOT INDUCE VOMITING
GET MEDICAL ATTENTION

\*\*\*\*\*\*\*\* \*\*\*\* SECTION 08 SPECIAL HANDLING PROCEDURES \*\*\*\*\*\*\*\*\*\*\*\*\*

RESPIRATORY PROCTECTION(SPECIFY TYPE)
NOT GENERALLY REQUIRED

VENTILATION..... LOCAL EXHAUST SATISFACTORY

PROTECTIVE GLOVES..... RUBBER OR NEOPRENE

EYE PROTECTION ..... CHEMICAL SAFETY GOGGLES AND OR FACE SHIELD

OTHER PROTECTIVE EQUIPMENT
DEPENDING ON LOCAL CONDITIONS, RUBBER BOOTS AND APRON MAY BE NEEDED

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* SECTION 09 SPECIAL PRECAUTIONS \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE DO NOT STORE WITH STRONG ALKALIES, CONTAINER MUST NOT BE USED FOR ANY OTHER PURPOSE, KEEP TIGHTLY CLOSED

OTHER PRECAUTIONS
AVOID CONTACT WITH SKIN AND EYES

THE INFORMATION HEREIN IS BASED ON TECHNICAL DATA THAT IS BELIEVED TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILL AND AT THEIR OWN DISCRETION AND RISK. SINCE CONDITIONS OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRENTIES, EXPRESS OR IMPLIED, AND ASSUME NO LIABILITY IN CONNECTION WITH THE USE OF THIS INFORMATION.